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AN ANALYSIS OF TAX REFORM IN MALAYSIA

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ABSTRACT

This thesis considers the implications of reforming the tax system of a developing country, using Malaysia as the case study. It examines two main issues. First is to analyse the macroeconomic effects of reforming the tax system, and second is to estimate the labour supply functions with taxation at the microeconomic level.

The thesis reviews the literature on the experiences of other countries in tax reform. It examines in detail the Malaysian macroeconomy and tax system to gain an insight into the processes and interactions between economic performance, fiscal policy, and tax structure for the last twenty five years.

In examining the first main issue, the computable general equilibrium (CGE) model is used to perform counterfactual analysis of tax reforms on the Malaysian economy. From the simulations on revenue-enhancing tax reform, we found that corporate tax would be the best instrument to raise revenue without hurting households or negatively affecting GDP aggregates. The simulations on revenue-neutral tax reform showed that the current tax system could be made more efficient by changing the structure of direct taxes and adopting VAT.

On the second issue, we adopt the instrumental variable approach with selectivity adjustment to estimate the parameters of labour supply with taxation for Malaysia. The modelling procedure estimates the equations for participation, wage, and hours of work. The results show that the effect of taxes on the Malaysian labour supply response is weak. In addition, the labour supply curve is backward bending starting from the lowest wage level. Without the welfare and benefit system found in Western societies, workers with low wages increase their hours of work in order to reach an income level that could meet their household consumption needs.

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DECLARATION

Except where otherwise acknowledged in the text, this study is entirely my own work and has not been submitted for any academic award in this or any other university or institution.

Signed:

Victor E. L. Wee

June 1997

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ABBREVIATIONS

AGE	Applied General Equilibrium
CGE	Computable General Equilibrium
CPI	Consumer Price Index
EPU	Economic Planning Unit
ER	Economic Report
FDI	Foreign Direct Investment
GOM	Government of Malaysia
HIS	Household Income Survey
ITA	Investment Tax Allowance
IV	Instrumental Variable
LFS	Labour Force Survey
LNG	Liquefied Natural Gas
METR	Marginal effective tax rate
NEP	New Economic Policy
NFPE	Non-Financial Public Enterprise
OPP1	First Outline Perspective Plan
OPP2	Second Outline Perspective Plan
PETRONAS	National Petroleum Corporation
PIA	Promotion of Investments Act
RM	*Ringgit Malaysia* (Malaysian Ringgit)
SAM	Social Accounting Matrix

Chapter 1

INTRODUCTION AND SCOPE OF STUDY

1. BACKGROUND

Although some developing countries have made various attempts at reforming their tax systems after the Second World War, tax reforms in the eighties and nineties have become for many a matter of urgency. Many countries faced widening fiscal deficits and high debt burden. Reducing fiscal deficits requires some combination of lower public spending and higher public revenue. Given their heavy public expenditure commitments, many governments are reluctant to make a drastic cut into their spending since this would place their development aspirations in jeopardy. Money creation in excess of real economic growth is, at best, a temporary source of finance since it can cause inflation. Many developing countries have limited amount of resources available for debt service and their governments do not wish to increase their debt burdens that are already high.

Ultimately, the level of public spending that can be committed by a country is determined by the amount of taxes and revenue it can raise as well as the public debt it can commit on the basis of future taxes. Taxes remain the principal income source for the central government. Therefore, improving the tax system is a necessary and sustainable way to raise government resources. However, the attempt to raise tax revenue does not necessarily imply increasing tax rates, since this can potentially distort the incentive mechanisms of private agents and encourage them to evade tax (Hamada, 1994). Many countries turn to tax reforms as a way of raising revenue and increasing the efficiency and equity of their tax systems. Indeed, when planning a tax reform the government will need to explore ways of raising tax revenue without creating a burden for the tax payers and distortions in the economy.

The major purpose of this thesis is to examine the implications of reforming the tax system of a developing country. We briefly assess the experiences of other developing countries in terms of their efforts in tax reforms with the view of drawing some lessons from them. For the rest of the thesis, we use the case of Malaysia for our study. We examine the transformation in Malaysia's fiscal and tax policies during the last 25 years, perform simulations of tax reforms on its macroeconomy, as well as estimate the parameters of its labour supply with taxation.

2. ECONOMY IN TRANSITION

The last two and a half decades brought significant changes to the Malaysian economy. From a largely agrarian economy, it is now transformed into a rapidly industrialising economy that has successfully pursued growth with distributional objectives. Its economy grew rapidly in the seventies as a result of buoyant commodity prices and favourable external conditions. The rapid growth provided the country with the resources necessary for its ambitious socio-economic development programmes aimed at eradicating poverty and restructuring society. Public development programmes as well as the non-financial public enterprises grew rapidly during the seventies.

At the start of the eighties, prolonged world recession and poor export performance prompted the government to adopt counter-cyclical programmes. While these programmes boosted the economy in the short-term, they soon resulted in growing deficits on the government budget and the current account of the balance of payments. Foreign loans grew sharply to finance the deficits and public debts rose to an unprecedented level. The government acted quickly to deal with the situation. Since 1984 it adopted wide-ranging adjustment measures that had a profound effect on the direction of fiscal policies and economic management for the country. The measures include consolidation of the public sector, arresting the rapid expansion of public expenditure to reduce budgetary deficits, privatisation of public enterprises, relaxing certain guidelines and legislative measures that constrain public enterprise, and providing liberal investment incentives to investors.

These policy measures, coupled with improved external conditions, helped the economy to turn around in 1987 and make rapid recovery. Since then the Malaysian economy has consistently registered growth rates above 8 percent per annum. The country's commitment to implement programmes under the New Economic Policy brought significant improvements in income distribution, poverty reduction, and increased participation of Malays and other indigenous groups in modern economic activities. The quality of life, literacy, longevity and health of the population have improved markedly.

As part of the efforts to re-orientate Malaysia's development strategies in the mid-1980s, the government took steps to improve the tax system to stimulate private sector investment and economic growth. By 1986, several tax reforms were underway. The corporate income tax rate was reduced in stages to stimulate investment and keep abreast with the tax regimes of neighbouring countries. The investment incentives and tax allowances for the manufacturing sector were expanded, especially with the adoption of the Promotion of Investment Act, 1986. The marginal personal income tax rates were brought down to encourage work and savings. Following the decline in oil prices and exploration activities in the early eighties, the Second Generation Production Sharing Contracts were adopted to improve the terms and incentives to the contractor. Export duties on most primary commodities were reduced and later eliminated. Excise and import duties were gradually reduced as a means of keeping consumer prices down and relieving the tax burden on the poor.

At the beginning of the nineties, the Malaysian government adopted the Second Outline Perspective Plan that builds on the experiences and lessons from the past two decades of development. The plan aims at creating an environment of sustained economic growth, with manufacturing and modern services performing the role of growth sectors. There are several fiscal policy implications under this plan. They include the adoption of fiscal policies that help Malaysian businesses to be more efficient and competitive, concentrating public expenditure in areas with the highest economic and social payoffs, and reforming the tax system so that it could generate revenue to meet public expenditure requirements without distorting the incentives to work and invest.

3. TAX ISSUES IN MALAYSIA

Although tax rates were reduced after 1986, tax collection efforts were able to keep abreast with economic growth and public expenditure. In fact, tax revenue as a percentage of total expenditure grew from 49 percent in 1986 to 80 percent in 1995. This was partly due to the rapid economic growth that increased revenue collection from income and commodity taxes, as well as the restrained growth of public expenditure through greater fiscal discipline and privatisation public enterprises. However, there are problems with the current tax system, which can benefit from reform to increase efficiency and equity.

Petroleum had been an important source of revenue in the eighties. Since oil prices are volatile and petroleum production in Malaysia has reached a plateau, the tax burden in the nineties would increasingly have to be shouldered by income and consumption taxes. While Malaysia appears to be fairly successful in mobilising income tax revenue, the tax payers are predominantly employees and more effort would have to be made to reach the 'hard-to-tax' groups. The tax system has become complex as a result of amendments adopted during successive annual budgets and the wide range of tax holidays, tax exemptions and allowances used to promote investments. When the benefits from different tax incentives occur simultaneously, not only are some of the incentives made redundant but they also erode Malaysia's tax base.

Indirect taxes contribute a declining share of tax revenue, partly as a result of the revision in tax rates. The reduction in import duties and particularly export duties had resulted in a decline in revenue from trade taxes. The current sales and services taxes recorded a sharp decline in the share of tax revenue despite dynamism in business activities and private consumption because of the narrow base of these two taxes. In addition, sales tax is complex, expensive to administer, and provides a wide scope for tax evasion. The adoption of value added tax to replace the sales and service taxes seems to be a logical step to raise the revenue of indirect tax on consumption and increase fiscal neutrality.

The tax system is deficient in many ways despite attempts to improve it since the late eighties. Although the Malaysian tax system exhibits a relatively high degree of revenue productivity, a tax reform will be needed to address these deficiencies and set in place a broad-based, more equitable and neutral system of taxes that would be easier to administer and comply with. According to Ahmad and Stern (1991: 2), tax reform concerns the search for, and analysis of, systems which are improvements on the existing state of affairs, while tax design is concerned more with the specification of an appropriate tax structure. The analysis of tax reform would involve examining the initial position of the tax system and the impact of tax changes on the economy and households.

In this thesis, we will be asking the following questions:

1. What are the goals and approaches to tax reform? What are the experiences of developing countries in tax reforms in terms of the scope, context, substance, and timing? Are there lessons and trends from the variety of reforms adopted in developing countries that we can draw upon?

2. How had Malaysia's economy and fiscal policies evolved during the last twenty five years? What are the implications of Malaysia's development policy on the direction of future fiscal and tax policies?

3. What are the characteristics and trend of the tax system? How responsive are the different tax instruments to income growth? What are the strengths and weaknesses of the tax system?

4. What are the effects of raising each category of taxes on the economy, such as macroeconomic aggregates, prices, real wages and real household income, consumption and savings? If the government wishes to raise tax revenue, which category of taxes would be the best instruments to achieve this, at least cost to the macroeconomy and households? Can the tax system be reformed in a way that improves efficiency and equity while maintaining or increasing tax revenue?

5. What are the functional parameters of labour supply with taxation for a developing country with socio-economic and institutional characteristics that differ from developed countries? Would an increase in tax bring about a reduction in participation and labour supply? Since most of the studies on labour supply with taxation are conducted in developed countries, are there any notable differences in the results obtained from this empirical analysis?

4. STUDY FOCUS AND METHODOLOGY

In addressing the questions above, the thesis takes up the question of reforming the Malaysian tax system in three stages. In the first stage, we perform a detailed examination of the characteristics and trends of the Malaysian macro economy and tax system, and trace the factors shaping the evolution of economic, fiscal and tax policies. The purpose of this examination is to gain an insight into the processes and interactions between economic performance, fiscal policy, and tax structure in Malaysia during the last twenty five years.

The issue of how much tax revenue to raise is very much tied up with the issue of the growth of public expenditure and how public resources are utilised. In Malaysia, it is necessary to examine the economic transformation and the establishment of development priorities since 1970. As we shall see later in Chapter 3, public expenditure grew rapidly during the seventies and early eighties not only because of socioeconomic development priorities, but also as a result and in anticipation of rapid growth in tax revenue that benefited from the boom in commodity prices. Faced with growing budgetary deficit and the onset of a recession in the first half of the eighties, the Malaysian government adopted a series of radical measures to improve economic management, control public expenditure, and alter the nature of fiscal and tax policies. With fiscal prudence and better management of public resource utilisation, the tax system was able to generate the revenue required to fund public expenditure programmes despite tax rate reductions. In this stage of the analysis, we also examine how the tax structure had evolved from being dependent on taxes on foreign trade and natural resources to one which generates more revenue from direct taxation. The analysis highlights the inherent weaknesses in the tax system despite being relatively productive in revenue generation. As a diagnostic tool, buoyancy coefficients are estimated for each major category of taxes to provide an indication on the trend of tax revenue generation and the directions for future tax reform.

The question of tax reform is examined against the background of the experiences of other countries. During the eighties, a large number of countries had chosen to reform their tax system, either through the pressure of fiscal difficulties or to seek new ways to update their taxes.[1] In addition, substantial progress was made towards broadening the base of income tax and rate reduction, which brought about horizontal gains in equity and efficiency in countries throughout the world (Musgrave cited in Khalilzadeh-Shirezi and Shah, 1991: 247). There is also a new approach adopted in the more recent reforms which de-emphasises tax as a means for achieving vertical equity, which is a far cry from the highly progressive tax regimes advocated by Kaldor and Kalecki for developing countries in the 1950s. Among the more significant development in tax reform is the widespread adoption of value added tax (VAT) among countries. The World Bank (1988: 88) noted that most successful tax reforms in developing countries have introduced some form of VAT, both to reduce distortions in production and trade as well as to generate adequate revenues to compensate for revenues lost through rationalising other tax instruments.

The second stage of our analysis on tax reform is simulate the economic effects of varying each category of taxes within a general equilibrium framework. The traditional way of using the partial equilibrium approach for tax policy evaluation has its limitations since it relies on *ceteris paribus* assumptions. This approach is unable to address the interlocking general equilibrium effects arising from the tax change. In a computable general equilibrium (CGE) model, both quantities and relative prices are determined endogenously, and numerical solutions for market clearing prices are found on all product and factor markets. Many studies on taxation, including those using the CGE approach, look at tax incidence on sectors and households. In our analysis, we take account of initial positions and use the CGE model to trace the effects of the tax reform along various dimensions of the macro economy, such as GDP, consumption, investment, consumer prices, exchange rates, real wages, and household aggregates. The thesis explores into the categories of taxes that could be raised to generate a certain level of government revenue, with minimal negative effects for the households and the economy. The thesis also investigates whether there could be some efficiency gains from reforming the structure of direct and indirect taxes in a revenue-neutral context. One of

[1] The countries include Austria, Australia, Barbados, Bolivia, Canada, Colombia, Denmark, El Salvador, Finland, Guatemala, Germany (F.R.), Grenada, Greece, Hungary, Indonesia, Jamaica, Japan, Kenya, Malawi, Mexico, Philippines, Portugal, Republic of Korea, Singapore, Spain, Turkey, and Zimbabwe (Gillis, 1989b; Thirsk, 1991; Bardai, 1993).

the policy experiments involve the adoption of value added tax in place of the existing sales and services taxes.

In the third stage of our analysis, we adopt a micro econometric approach of estimating the parameters of labour supply with taxation using the combined data from the Labour Force Survey and Household Income Survey. A fundamental question is whether changes in taxes have an impact, if at all, on the response of individuals towards participation and hours of work. Most of the estimations on post-tax labour supply function parameters are derived from studies conducted in developed countries, while hardly any empirical work have been done in developing countries, with a few notable exceptions. In Rochjadi and Leuthold (1994), the CES direct utility function was used in their estimation of the labour supply function parameters for Indonesia. Since this functional form constrains the income effect to be negative, they produce positive compensated wage elasticity estimates that are generally in conformity with the results obtained from studies in developed countries. Although the methodology produces non-controversial elasticity estimates for Indonesia, there are no additional insights to be gained from their estimation with regards to the labour supply response of a developing country. To avoid any preconceived notions on the shape of the labour supply curve, we use the two stage least square instrumental variable approach with selectivity adjustments. In this approach, we estimate the participation equation, wage equation, and hours of work equation for male and female heads of households.

There is no reason why the labour supply response of a developing country, with their own set of socio-economic and institutional characteristics, should correspond with the general findings of empirical studies conducted in developed countries. Many developing countries, such as Malaysia, do not have an equivalent welfare and benefit system found in developed countries. Without unemployment benefits and income support programmes, there is a stronger motivation for a person without a job to get back to work or perform some part-time work. There is no financial benefit for remaining unemployed or limiting his hours of work as might be the case if he stands to benefit from welfare transfer payments. In addition, at low levels of wages, members of poor households in developing countries have to increase their hours of work in order to meet the income and consumption requirements.

5. STRUCTURE OF THESIS

The structure of the thesis follows from the questions raised in Section 3 and the three stages of analysis discussed above. Chapter 2 contains a review of the theoretical and empirical literature of tax reform in developing countries. On the theoretical aspect, it discusses some principal goals of a tax reform and the approaches to development taxation. From the empirical literature, we learn about the experiences of many developing countries that have adopted tax reforms in recent years. This chapter examines the approaches to tax reform, citing examples and lessons from developing countries. Finally, it discusses some common themes that emerge from the experiences of countries that embark on tax reforms, and which point towards the direction of future tax reforms.

Chapter 3 examines the last twenty five years of economic transformation and policy reform in Malaysia. The issues on tax reform should not be examined in isolation, but considered in relation to the overall economic and fiscal policies of the country. This chapter provides a historical review of the country's economic development, public revenue and expenditure patterns, and the underlying reasons for policy reforms. Many of the radical policies adopted after 1984 have fundamentally altered and transformed Malaysia's economic management, the size and role of its public sector, as well as its fiscal and tax policies. We consider the policy framework of Malaysia's Second Outline Perspective Plan and the implications it has for fiscal policies in the nineties and beyond.

In Chapter 4, we analyse the Malaysian tax structure and trend since 1970. We consider changes in the structure of taxes and the contribution of direct and indirect taxes and their components to government revenue. Upon examination, some taxes are found to be saddled with inherent problems. As a diagnosis of the prospects for future revenue, we estimate the tax buoyancy coefficients and identify areas of weaknesses that should be addressed in a tax reform.

After the discussion on the structure, trend and characteristics of various categories of taxes, Chapter 5 uses a micro-macro applied general equilibrium model for Malaysia to examine the effects of tax reform simulations on the economy. The chapter provides an overview of CGE models that have been developed since 1960 for policy evaluation, as well as some economic models developed for Malaysia. After calibrating the Malaysian Micro-Macro Model, we perform nine tax reform simulations and compare the results with the baseline simulations in terms of four sets of indicators, namely, real GDP aggregates, price movements, wage movements by skills and occupational groups, and household aggregates. The chapter examines the category of taxes that could raise 10 percent of government revenue for 1990-99 with minimal negative effects for households and the economy. In addition, it also investigates if a reform in the structure of direct and indirect taxes within a revenue-neutral context could result in some efficiency gains.

The next two chapters take up the question of the effect of taxation on labour supply. Given the large volume of literature on this topic, as well as a wide variety of estimation techniques and model specifications used in previous studies, Chapter 6 performs a literature review on the theoretical and empirical aspects of estimating the parameters of labour supply with taxation. In Chapter 7, we draw from the methodological experience of second generation work on labour supply estimation and use the instrumental variable approach for Malaysia. Using micro econometric techniques, we estimate the participation equation, wage equation, and hours of work equation for male and female heads of households in 1984 and 1992. The chapter discusses the findings in the light of the results from other studies, and put forward some reasons why the estimation results seem reasonable in the Malaysian context.

In the final chapter of the thesis, we assemble the findings and results of our research. We draw together the lessons gained from the analysis of reforming Malaysia's tax system, and propose some areas for future research.

Chapter 2

TAX REFORM IN DEVELOPING COUNTRIES

1. INTRODUCTION

Taxes are used by governments for a variety of purposes. They are raised to meet public expenditure for the provision of goods and services and transfer payments. They are used in fiscal policy to regulate aggregate demand in the economy, as well as bring about greater equity in the distribution of income and welfare in the country. Furthermore, taxes are imposed to control the volume of inports into the country in order to achieve balance of payment equilibrium. In a tax reform, governments are generally concerned that their tax system facilitates the attainment of several public policy objectives. Besides raising adequate revenue for the government, the tax system must spread its burden equitably and avoid the misallocation of resources. The tax reform should not disrupt the pattern of production, trade, consumption, saving, and investment. In addition, the tax system should also be administratively feasible to facilitate compliance and collection. Clearly, it is difficult to satisfy all these objectives simultaneously. As noted by the World Bank (1988), tax reform is a matter of trade-offs.

In this chapter, we undertake a review of the theoretical and empirical literature of tax reform in developing countries. First, we review some of the goals of a tax reform: revenue generation, promotion of growth, savings and investment, promotion of equity and efficiency, and simplicity of administration and compliance. Next we discuss the approaches to development taxation, namely, optimal tax reform and market-oriented tax reform. This is followed by an examination of the experience of developing countries in tax reform. Finally, we draw some lessons from the experience of developing countries in tax reforms and the emerging themes that point towards the future direction of reform issues.

2. GOALS OF TAX REFORM

This section discusses some of the goals of tax reform: revenue generation, promotion of growth, saving and investment, achievement of equity and efficiency, and simplicity in administration and compliance.

2.1 Revenue Generation

The most important reason why taxes are levied is to raise revenue for the government. Governments require resources to meet a wide variety of expenditures, ranging from public administration and defence to the provision of social services and infrastructure. In developing countries, raising the level of government expenditure, particularly public investment in key areas of the economy, has often been regarded as a necessary element of the development process (Ahmad and Stern 1989).

Over the long term, revenue generation must keep pace with the expansion of expenditure. The government should ideally choose a tax base that will expand in relation with spending so that a few changes in tax rates can meet the revenue requirement of public expenditure growth. The importance of tax revenue generation in developing countries cannot be overstated. Total central government expenditure as a percentage of GNP for middle income countries was 21.7 per cent in 1972 and 27.5 per cent in 1986, while the percentage for total tax revenue to GNP was 14.8 per cent in 1972 and 17.6 per cent in 1986 (World Bank 1988: Tables 23 and 24). The shortfall in tax revenue in 1986 was substantial, amounting to over 10 per cent of GNP.

The revenue requirement of a country is closely related to the efficiency of revenue utilisation. The additional revenue raised could either be used to improve the quality of life and lay the foundation for growth or be wasted on inefficient projects not linked to development. While growth in public expenditure would need to be matched by revenue expansion, the relationship can also operate the other way. As noted by Please (1971), the rapid growth in revenue can sometimes stimulate the rapid expansion of the expenditure pattern that would call for further revenue growth. When these effects work quickly, the rapid growth in expenditure can give rise to public finance difficulties, as was experienced by countries such as Mexico and Nigeria after receiving revenue windfalls from the oil price increases of the 1970s.

2.1.1 Tax revenue and level of development

In a study of the tax structure of 86 countries around 1981, Tanzi (1987) finds that on average, the ratios of taxes to GDP collected by developing countries amounted to 13 per cent for countries with per capita income below $849 and 18 per cent for countries with per capita income between $850-$1,699. Ten low-income countries had tax ratios of less than 10 per cent, while eleven medium income countries had tax ratios exceeding 25 per cent. Variations in tax ratios to GDP could only be expected because of differences in the levels public spending, tax base and structure, administrative capacity, as well as historical and cultural factors.

Tax revenue differences between groups of countries are also partly a matter of different stages of development. The capacity of countries to raise taxes increases with the size of their per capita incomes, as revealed in studies relating the level of development and the structure of taxation (Hinrichs 1966; Musgrave 1969). As incomes grow and countries become more urbanised, there will be greater demand for public services and higher level of tax revenue. This is shown by the growth in the share of central government revenue to GDP that rose from 14 per cent in 1960 to 18 per cent in 1970 and 24 per cent in 1980 for middle income countries (Newbery and Stern 1987). Studies undertaken in the 1970s have shown that there are many factors that influence the level of taxation. They include urbanisation, monetisation, the relative importance of the mining and agricultural sectors, and the importance of foreign trade.

Countries in the early stages of development lack 'tax handles' or simple ways of collecting revenue. Hinrichs (1966: 106-108) relates the pattern of change in tax structure with level of development with a fourfold classification: traditional, transitional (which include 'breakaway' from old and 'adoption' of new), and modern. Traditional societies rely on direct taxes on agriculture, poll taxes and non-tax revenue. As the society becomes more developed, indirect taxation becomes more important, particularly trade taxes if it is an open economy. Indirect and direct taxation gain in importance as domestic production capability, monetisation and transactions increase within the society. This is only a stylised characterisation and does not suggest a deterministic pattern that all countries will follow. The averaging of the tax structures of low-income countries used in the study may be misleading since the trends of direct and indirect taxes of individual countries may be different.

The Fiscal Affairs Department of IMF had undertaken studies that explore the cross-country relationship between identifiable tax handles and tax ratio. These 'handles' are taken to be a proxy for taxable capacity.[1] Studies on tax elasticity[2] and buoyancy[3] carried out for various individual countries[4] have found that general sales taxes, excises and consumption taxes have elasticities in excess of unity. Income taxes are found to be an elastic source of revenue in some studies but not in others. Custom duties and stamp duties are relatively inelastic (Ahmad and Stern 1989). While these studies are interesting, they do not provide direct guidance for policy since the estimated elasticity of a particular tax relates only to the actual revenue collections during the period under consideration.

Although many tax reforms are intended to enhance revenue, in some cases they are designed to be revenue neutral, at least in the short term. The revenue neutral tax reforms merely seek to replace the revenues the tax system would have generated had the reforms not taken place. Gillis (1989) cites some examples of tax reform packages where immediate enhancement of revenue was not the priority. These include the tax-reform initiative for Japan in 1949-50, Brazil in 1965, Liberia in 1969, Bolivia in 1976-77, and Colombia in 1986. The Indonesian reform of 1983-84 was intended to be revenue neutral over the short run, although the system would be capable of revenue enhancement should the need arise over the longer term.

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[1] Goode (1984) defines 'taxable capacity' as the ability of people to pay and the ability of the government to collect. The 'tax effort' reflects the degree to which taxable capacity is used. The tax ratio i.e. the ratio of total tax revenue to GNP, reflects both tax capacity and tax effort.

[2] Tax elasticity shows the ability of the tax structure to generate revenue growth arising from changes in gross income or output levels.

[3] Tax buoyancy is the relationship of total revenue to income or output.

[4] In Latin America countries the study for Paraguay was undertaken by Mansfield (1972), Colombia by Levin (1968), and Central America by Wilford and Wilford (1978). The revenue elasticity and buoyancy in the Indian tax system were examined by Purohit (1981) and Bagchi and Govinda Rao (1982).

2.2 Promotion of Growth, Saving and Investment

2.2.1 Growth

In examining the relation between the level of taxation and the rate of economic growth for twenty countries, Marsden (1983) concludes that countries with lower taxes experienced higher rates of growth. In the countries studied, lower taxes are associated with higher real returns to savings, investment, work, and innovation, as well as increasing the supply of factors of production and raising total output. The fiscal incentives provided by low-tax countries appear to have shifted resources from less productive to more productive sectors and activities, thereby increasing the overall efficiency of resource utilisation. The reverse appears to be true for some high-tax countries. While this finding is illuminating and points towards 'supply side' economics, there are problems of comparability and interpretation at the level of aggregation adopted. In the *World Development Report 1988* (World Bank 1988), tax levels are shown to be rising in all countries in recent years regardless of income levels, economic structures, or growth rates.

In designing a growth-promoting tax system, Carl Shoup (1966) emphasises the need to exempt the poor from taxation and to keep taxes on profits low or non-existent in order to stimulate entrepreneurship, and especially risk taking. By explicitly exempting capital income, it is possible to achieve economically neutral taxation of new investment (Harberger 1981; Meade *et al.* 1978; Bradford 1986). Shoup (1966) notes the importance of the administrative and political factors in a growth-promoting tax system. Favourable administrative and political factors are important because private capital investment and private savings are strongly encouraged by a stable and predictable fiscal system. As Pigou (1947) argues the accumulation of capital is discouraged in a system that has unequal treatment of different people without a good cause since this leaves a sense of insecurity as to who may be the next victim.

2.2.2 Savings and investment

There is a the large body of studies examining the economic effects of taxes on savings and investment in the developed countries, most notably in the United States (see Summers 1981; Sandmo 1985; Bosworth 1984). However, no clear conclusions have emerged on the key issues. Aggregate level of savings is not particularly sensitive to tax-induced changes in the rate of return, although tax factors may alter the composition of financial savings (Bird and Oldman, 1990). Total national saving consists of domestic private saving, public saving and foreign saving. As argued in Musgrave (1963), the effect of taxes in discouraging private savings can be offset by the resulting increase in public savings.

Many developing countries use incentives to encourage investments. Shah and Toye (1978) perform a survey of the range and type of incentives commonly employed in developing countries and their effect on investment. There are essentially three approaches that researchers have used to examine the relationship. One method used to measure the impact of fiscal incentive schemes is to look for changes in the share of investment in gross national product after the incentives have been introduced. This approach was adopted by Katz (1972) for Mexico and Tanzi (1969) for Ecuador. The second approach is to interview a representative sample of businessmen who have benefited from the schemes on how much their investment decisions were influenced by the incentives. This approach was used in case studies of Mexico (Ross and Christensen 1959), Jamaica (Chen-Young 1967), Pakistan (Azhar and Sharif 1974), Brazil (Goodman 1972), and Nigeria (Olaloku 1976). The third method is to make inferences from the published profit levels of tax exempt firms by calculating the net present value of the firm's profits with and without tax exemptions. Azhar and Sharif (1974) and Kemal (1975) used this approach for Pakistan and Bilsborrow and Porter (1972) for Colombia. Shah and Toye (1978) argue that there are conceptual difficulties and data inadequacies that handicap attempts to evaluate the effectiveness of the investment incentives. Despite these problems, the studies seem to point towards little or no effect of the investment schemes in inducing new investment. Usher (1977) asserts that the interaction of tax systems in host and home countries is important in examining the economics of tax incentives. He argues that the incentives granted by host investors to foreign investors will be ineffective unless the home country of the investors allows them to claim a credit against taxes owed to the residence countries for the tax incentives enjoyed in the host country.

2.3 Promotion of Equity

2.3.1 Benefit Principle

Equity concern has always been at the core of tax policy. There are two interpretations regarding equality or equity. First, contributions should match benefits received or the 'benefit principle'. Second, contributions should reflect ability to pay or the 'ability to pay principle'.

The benefit criterion links expenditure with tax and where each taxpayer would be taxed in line with his or her demand for public services. While the general benefit tax may be of theoretical interest, this principle is applied to the provision of particular services through the charging of fees, user charges, or tolls. The *World Development Report 1988* argues that user charge are efficient in funding public expenditure and should be used wherever a publicly produced good or service can be sold. Tax financing should be reserved for cases where user charges are not appropriate, such as where the costs or benefits of public goods cannot be assigned to individuals, or taxes are used to compensate for market failures, or to achieve a distributional goal (World Bank 1988: 79).

Benefit theorists differ in opinion whether burden distribution should be proportional or progressive. In interpreting the benefit principle, the issue is whether to focus on the cost of the service rendered to a particular person, or whether it is on what a person would be willing to pay (Musgrave 1985). In the first approach, the optimal quantity to produce and cost a public good[5] is where the marginal benefits of individuals equal the marginal costs of production, and each individual is taxed according to the marginal benefit derived from the public good (Cullis and Jones 1992). In the latter approach, the benefit tax becomes a Lindahl price.[6]

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[5] Samuelson (1954: 387) defines a public good as one 'which all enjoy in common in the sense that each individual's consumption of such a good leads to no subtraction from any other individual's consumption of that good.'

[6] If there are two consumers who must share in the cost of a public good, the more A pays, the less B will have to pay. Given the cost schedule for the product, A's offer curve can be translated into a supply curve from B's point of view, and vice versa. The intersection of the two curves determines the quantity to be supplied. At this solution each pays the Lindahl tax price which is equal to the value of the marginal utility he derives. The sum of the two tax prices adds up to the cost of the product. Lindahl notes that the intersection is reached only on the assumption of equal bargaining power (Musgrave and Peacock, 1958: 89).

The ability to pay principle has a long history as well, dating from Mill's formulation in the 1840s. Under this principle,[7] people with equal capacity should pay the same (horizontal equity), and people with greater ability should pay more (vertical equity). It will be necessary to define how the ability to pay is measured. Ideally, this measure should reflect all the factors contributing to a person's entire welfare, including consumption, wealth holding, and enjoyment of leisure. Since the value of leisure cannot be measured, the second best approach is using an index such as income, consumption, or wealth.

2.3.2 Taxing consumption

Income has been widely used as the tax base. However, there has been support for consumption as the better choice for a more equitable tax base. The consumption tax approach differs from the income tax approach by excluding savings and places the same burden on people with equal potential consumption (Musgrave and Musgrave 1989). As Kay wrote in the *Telegraph* on 3 April 1995, the share of general consumption tax in tax revenue for the OECD countries increased from 1.7 per cent in 1965 to 17.1 per cent in 1992, while corporate income tax, specific taxes on goods, and property taxes declined during the period. The trend has been movement away from taxes that require the excise of judgement to taxes that are based simply on transactions. In developing countries, the burden of income tax is predominantly shouldered by workers in the formal sectors. The difficulties in implementing income taxes in developing countries as well as under inflationary conditions have led a growing number of tax economists in recent years to advocate shifting from income tax to consumption tax (Bird and Oldman 1990).

Experience with the direct consumption taxes in both developed and developing countries has been limited. Kaldor proposed the direct consumption tax for India (1956) and Ceylon (1960), but it was not successfully adopted. Direct consumption tax still has its merits for developing countries. Compared with the income tax, it is easier to

[7] Gillis (1989) notes that virtually all tax reform initiatives in developing countries have specific equity objectives in mind. Tax reforms are *redistributive* in nature when they seek to enhance vertical equity through reduction of after-tax income inequality. However, tax reforms can also be *distributionally neutral* when they are intended to leave the distribution of income essentially unchanged. This option is sometimes chosen to prevent the triggering of distributional battles that could side-track the adoption of the tax reform.

administer, more equitable, gets around issues such as timing for depreciation and income adjustment for inflation, economically neutral, and consistent with economic growth (McLure, 1989).

2.4 Promotion of Efficiency

2.4.1 Minimising excess burden

Efficiency is an important requirement of a good taxation system. The operation of the tax system is costly not only because of the costs of tax administration and compliance, but also for the excess burden it creates. Excess burden is also known as dead-weight loss or efficiency cost, which is a loss of welfare above and beyond the revenues collected. Taxes change the economic environment in which a consumer may be made better off or worse off. Some levels of utility should be used as reference for the compensated demand function arising from price changes as a result of taxation.

Following Hicks (1942), the two commonly used measures of the welfare effect of a price change are equivalent variation (EV) and compensating variation (CV). *Equivalent variation* uses the current prices as the base and asks what income change at the current prices would be equivalent to the proposed change in terms of its impact on utility. *Compensating variation* uses the new prices as the base and asks what income change would be necessary to compensate the consumer for the price change (Varian 1992: 161).

An important way of assessing the efficiency of a tax system is to measure the excess burden, which is the loss of welfare in excess of the tax revenues collected. Using the simple Marshallian approach, when the consumer price is raised from p_0 to the post-tax price $(p_0 + t)$ and demand changed from x_0 to x_1, the excess burden as suggested by Dupuit is approximately

$$W = \tfrac{1}{2}t(x_0 - x_1) = \tfrac{1}{2}t\Delta x$$

If η is the price elasticity of demand, the excess burden is given by[8]

$$W = \tfrac{1}{2}\eta t^2 p_0 x$$

[8] For derivation, see Cullis and Jones (1992: 185).

When considering the effects of several taxes at once, the Hicksian variations are used as measures. Mohring (1971) uses the equivalent variation and suggests that the excess burden of taxation is how much more taxes could be collected from the consumer than is currently collected, with no loss in utility, if the collection method were lump sum taxation.[9] On the other hand, Diamond and McFadden (1974) suggest the use of the compensating variation by defining excess burden to be that amount, in addition to revenues collected, that the government must supply to the consumer to allow him to maintain the initial utility level.

Harberger has pioneered the measurement of excess burden in a series of papers. By using the excess burden formulae, he examines the non-tax distortions caused by monopolistic pricing (Harberger 1954). He also considers the welfare cost of a progressive tax on labour income by individual income classes (Harberger 1964) and the dead-weight loss from the production distortion caused by differential taxation of the return to capital in the corporate and non-corporate sectors (Harberger 1966). The weakness of the earlier studies is the assumption of fixed producer prices. Chamley (1981) has shown the sensitivity of this assumption in his study of the welfare cost of capital income taxation.

2.4.2 Optimal commodity taxation

Since the application of the lump sum tax is limited,[10] a normative question in taxation is how to design a tax system that will yield efficient and fair outcomes. The trade-off between equity and efficiency loss is central to the concept of optimal taxation. In the case of optimal commodity taxation, the 'first best' solution is to tax all goods, including leisure, at the same rate since this would be equivalent to a lump sum tax that has no excess burden. Since it is impossible to place a tax on leisure, neutral taxation is not efficient. Some excess burden is inevitable when taxes are imposed on goods other than leisure. It will be necessary to choose a 'second best' solution to minimise the

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[9] A lump sum tax has no excess burden. It causes a parallel shift in the budget line and does not change the relative prices of goods. If a lump sum tax is used to raise the same revenue as a commodity tax, the lump sum will leave the consumer on a higher indifference curve.

[10] Although lump sum tax is efficient, it is not widely used because of the difficulty in establishing a tax that has no effect on individual behaviour. If it is to be truly non-distortionary, the tax must be based on potential income rather than actual income which is very difficult to assess.

overall excess burden of collecting tax revenues. According to the Ramsey rule (Ramsey 1927), excess burden is minimised when the percentage reductions in quantity demanded are equal:

$$t_x \eta_x = t_y \eta_y$$

where x and y refers to two categories of goods, η_x and η_x are the price elasticity of demand for goods x and y, t_x and t_x are the rate of tax on goods x and y. Dividing both sides of the equation by $t_y \eta_x$ would yield the inverse elasticity rule:

$$\frac{t_x}{t_y} = \frac{\eta_y}{\eta_x}$$

As long as there are no cross effects between goods, tax rates on commodities are set inversely proportional to price elasticities of the goods. Taxes on goods should not be set uniformly in an efficient tax system. Higher taxes are levied on relatively inelastic goods where the potential for distortion is much lower than goods with higher elasticity of demand.

Building on the implications of the Ramsey Rule, Corlett and Hague (1953) suggest that revenue can be increased efficiently by taxing more heavily the goods that are complementary to leisure. The intuitive reasoning is that if it is possible to tax leisure, then the 'first best' result would be obtained without excess burden. Since the authorities cannot tax leisure, taxing goods that are complementary with leisure can indirectly lower the demand for leisure.

In practice, it is necessary to depart from efficient taxation rules to meet distributional goals. The strict adherence to the Ramsey Rule can be highly regressive since this involves imposing higher taxes on necessities which will place greater burden on the poor. For greater vertical equity, society may be prepared to tolerate a higher level of excess burden in return for more equitable income distribution.

2.4.3 Optimal income taxation

The government would also be interested to design an optimal income tax to raise revenue. The optimal income tax system should maximise

$$W = U_1 + U_2 + \ldots + U_n$$

where U_i is the utility of the i^{th} individual, W is social welfare, and n is the number of people in the society. The model assumes that the total income available is fixed and individuals have identical utility functions that depend only on income and exhibit diminishing marginal utility functions. For maximisation of social welfare, each person's marginal utility of income should be equal, implying that income levels should be equal. In policy terms, the government should impose income taxes such that the after-tax distribution of income should be as equal as possible. This model implies a highly progressive tax structure where the rich are taxed heavily up to 100 per cent marginal tax rate, until complete equality is reached.

One way of accomplishing this is for the government to make income transfers from the rich to the poor by means of a negative income tax which consists of a lump-sum payment made to everybody, and thereafter a tax is levied on all other income.[11] Figure 2.1 shows a linear income tax schedule where 0A is the lump-sum payment (or negative tax handout) and a constant rate of tax t is levied on income. The linear income tax schedule is given by:

$$\text{Tax revenue} = -\alpha + tY$$

where $-\alpha$ corresponds to the lump-sum payment, t is the marginal tax rate and Y is income. The issue is to set the values for t and α that would minimise the excess burden associated with income redistribution. Higher value of t is associated with greater tax progressiveness and larger excess burdens. The optimal linear income tax will be the 'best' combination of α and t that maximises social welfare subject to the constraint of the required revenue to be raised. In his discussion of models of optimum income taxation, Stern (1976) suggests that social welfare is maximised when t = 19 per cent, assuming that the elasticity of substitution between leisure and income is 0.6 and the required government revenue is 20 per cent of income. He shows that a more elastic labour supply is associated with a higher cost of redistribution, and hence the optimal value of t is lower. In a society with extremely egalitarian objectives, where weights are

[11] Meade (1978) provides a discussion of such arrangements.

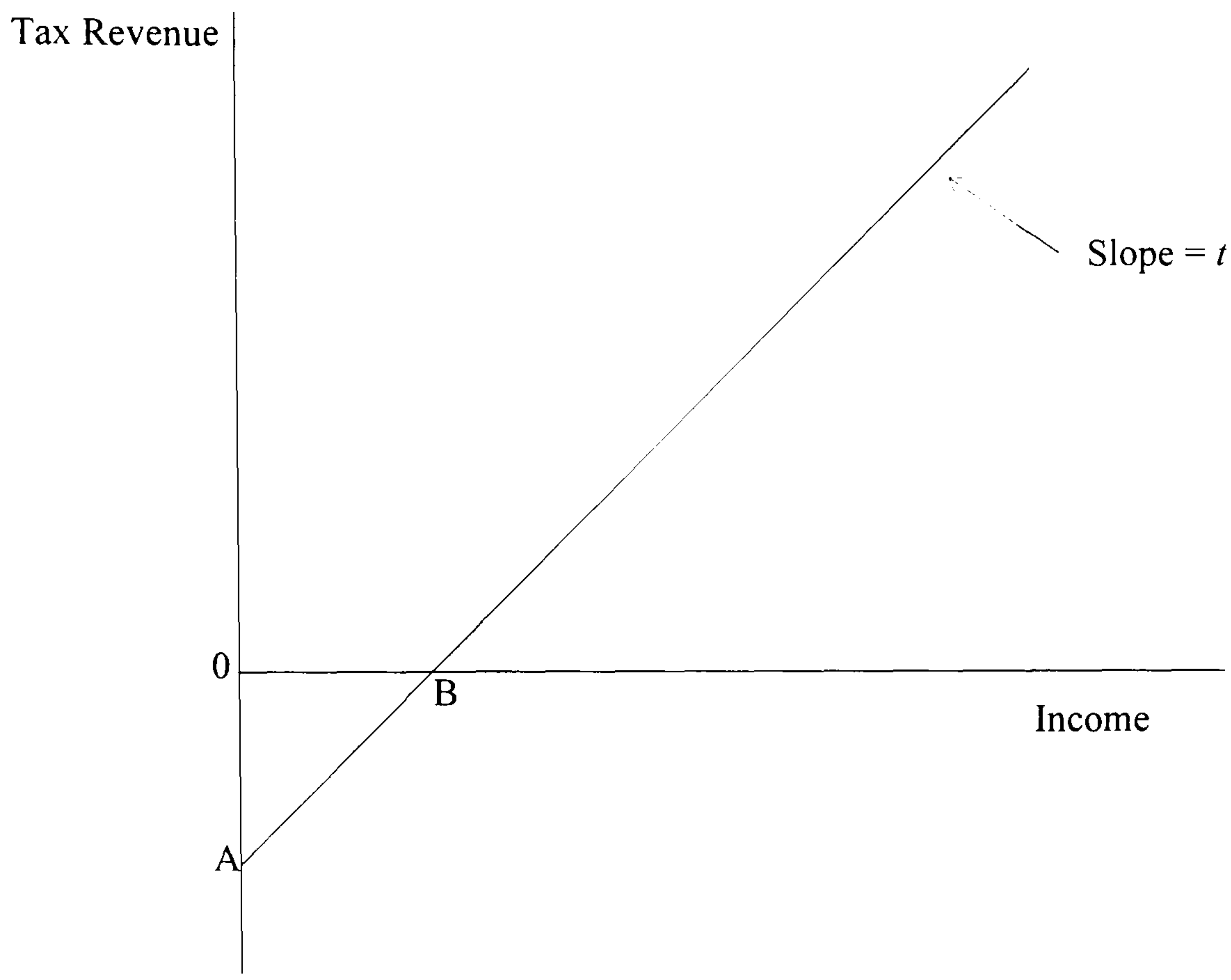

FIGURE 2.1 LINEAR INCOME TAX

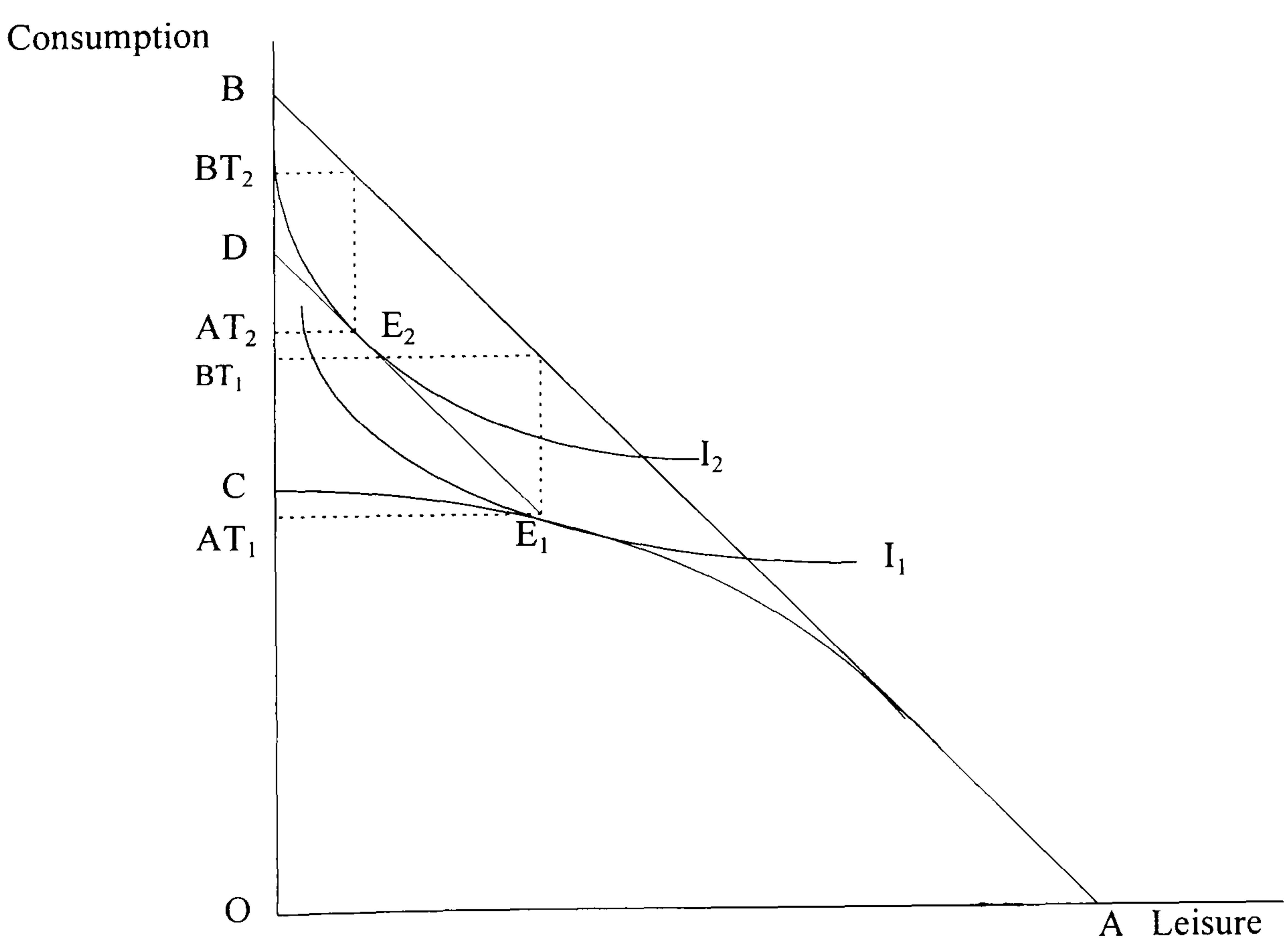

FIGURE 2.2 OPTIMAL NON-LINEAR INCOME TAX

only assigned to the social welfare function of persons with minimum utility, Stern finds that the maximum criterion for the marginal tax rate is about 80 per cent.

In the progressive income tax system, the marginal rate of tax varies with income. From an 'ability to pay' argument, the highest income earners pay the highest rates of taxation for the system to be 'fair'. However, there are some disagreement with this policy emerging from the literature on optimal non-linear taxation. Instead of taxing the highest marginal rate on the highest income earner, Seade (1977) argues that social welfare is maximised when individuals at the very top of the income scale pay marginal tax rate of zero. Commenting on the UK income tax, Kay and King (1986: 214) note that the marginal tax rates are high at the top as well as bottom levels of income, that is a U-shaped schedule. Contrary to previously held belief, the principle that emerges is that marginal tax rates should be low at both the highest and the lowest levels of income. High marginal tax rates on the largest incomes bring in very little revenue and are not worth pursuing if they have adverse consequences. On the other hand, the welfare support for low income families comes to nothing if their receipts are taken away by high marginal rates of tax.

It can be shown that even if the marginal tax rate of the higher income-earner is brought to zero, this would not bring a loss of tax revenue for redistribution to the poor. Figure 2.2 shows the optimal non-linear income tax. The budget line AB is the trade-off between leisure and income before tax for the individual with the highest income. After income tax, the budget line is a curvilinear AC. The individual maximises his income at E_1 where his indifference curve I_1 touches the budget line. His after-tax income is AT_1 and the tax revenue is (BT_1-AT_1). If the marginal tax rate is set to zero for income earned above BT_1, the budget line for this segment is given by E_1D, which is parallel to AB. The budget line for the individual is now AE_1D. The new equilibrium for the individual is E_2, as he increases his work effort and earns up to BT_2. The total tax paid remains the same, i.e. $(BT_2-AT_2) = (BT_1-AT_1)$ but the individual is better off since he has a higher after tax income of AT_2 and is on a higher indifference curve I_2. This implies that the welfare of the top income-earner can either increase or be held constant without the corresponding loss of welfare to others.

2.5 Simplicity of Administration and Compliance

An important aspect often overlooked during attempts in reforming taxes is the improvement of the institutions governing tax administration and tax compliance.[12] According to Gillis (1989), most of the early post-war reforms focused primarily upon changing the tax structure alone, which would be a sufficient condition for the failure of comprehensive, if not partial reforms. In reforming the tax system, it is necessary to keep the system as simple as possible for effective implementation. This is especially the case in developing countries given a lack of trained administrative personnel, resource limitations, and a lack of accounting sophistication amongst taxpayers.

Voluntary compliance is central to taxation where the large mass of taxpayers submit accurate reports of income and make timely payments of tax. Without voluntary compliance, the scale and scope of problems may be more than what any tax agency can handle (Radian 1980). A complicated reform can generate serious implications on tax administrators and taxpayers. The tax administration that requires high level of expertise to absorb the new procedures would be depleted of its personnel. As the public demand for more tax expertise to cope with the new procedures, the former tax administration employees would sell their skills as private tax advisers (Radian and Sharkansky 1979).

In the case of Indonesia, the two proximate objectives of its tax reform which are considered essential for obtaining the other tax goals are the drastic simplification of the tax structure and the depersonalisation of tax administration. Before the reform, the criteria for exemptions for small firms were complicated and tax officials had many discretionary authorities to grant them. Hundreds of ad hoc amendments had been adopted, which created a law that was incomprehensible to tax payers and tax collectors alike. The tax system, which was used to serve numerous non-revenue goals, became excessively complicated, replete with anomalies and vulnerable to corruption. The adoption of transparent criteria and the reduction of frequent contact between tax officials and tax payers reduce the scope of corruption in tax compliance and collection (Gillis 1985). The tax simplification in Indonesia does not only mean having lower and

[12] For an excellent and provocative discussion of the administrative dimension of taxation in developing countries, see Radian (1980).

more unified tax rates, it also involves dismantling all kinds of tax incentives and broadening of the tax base.

According to the World Bank (1988), some approaches that can be adopted for simplifying commodity taxes are: (a) shifting from the taxation of production to the taxation of consumption and (b) shifting from the taxation of international trade to the taxation of domestic transactions. Income taxes can be simplified by: (a) restructuring company taxes so that average effective rates are high for revenue purposes and marginal effective rate low for investment purposes, and (b) restructuring of personal taxes to include all sources of income, with lower maximum rates, fewer brackets, higher exemptions, and the elimination of most existing special allowances.

3. APPROACHES TO DEVELOPMENT TAXATION

After the Second World War, there are essentially two traditions influencing the design to development tax policies. First is the *interventionist* tradition that believes that the government could and should influence the achievement of a variety of policy objectives through the tax system. Prominent analysts using this approach include Heller (1954), Kaldor (1965), and Lewis (1966). The second is the *reductionist* tradition that argues the government cannot achieve many of the intended policy goals and it should not try to do so. The second approach, first advocated by Bauer (1957), is very much in the mould of the classical economics tradition and is now gathering a wider appeal (Bird and Oldman 1990).

3.1 Optimal Tax Reform

Optimal taxation, which has been the subject of theoretical research in recent decades, is very much linked with interventionism. Newbery and Stern (1987) explore into the application and implications of the optimal tax approach for developing countries. The optimal tax theory provides the foundation for sound empirical work by sorting out 'the grammar of the argument' (Atkinson and Stiglitz 1980) and increasing rigour and formalisation of the analysis (Bird and Oldman 1990). Ahmad and Stern (1984, 1986, 1987) have examined questions such as the design and reform of indirect taxation in terms of optimal taxation for India and Pakistan.

The central question in reforming a tax system is how best to raise additional revenue, since the extra taxation would affect the pattern of incentives and costs for different households and the productive system. The government has to consider how the tax changes are to be enforced and at what cost. The goal of optimal commodity taxation is to raise revenue from taxes on goods with as little loss of household welfare as possible.

The usefulness of the optimal approach to tax reform should be weighed against the reservations expressed on some of the policy recommendations of the optimal tax theory (Lindbeck 1987), the demands it makes on data requirements (Deaton 1987) and its insufficient recognition of the administrative dimension of tax reform (Bird 1989). Lindbeck provides three arguments against using optimum taxation as a basis for actual policy advice both in developing as well as developed countries. Firstly, optimum taxation formula captures very few types of mechanisms for adjustment by the individual agents (such as a shift between leisure and work or the consumption of different commodities), while in reality there are many other adjustment mechanisms for taxes. Secondly, even to calculate a single type of adjustment mechanism would require the optimum tax formula that relies on extremely special assumptions, such as identical preferences of all individuals, and special forms of the production function, such as the Cobb-Douglas functions. Thirdly, the calculations are very sensitive to alternative specifications of the various functions and the statistical parameterisation and are, therefore, subject to arbitrary decisions.

In contrast to Ahmad and Stern, Lindbeck (1987) recommends the adoption of uniform commodity taxes as the basis for the tax system, although selective taxes on goods can be used where the supply and demand elasticities are very low and the goods are consumed more by the rich than the poor (see also Cnossen 1978). The adoption of uniform indirect taxes differs from the optimum tax theory in that the adjustment of tax rates to differences in demand and supply elasticities would be an exception rather than the rule, and the functioning of the political process is an essential consideration.

3.2 Market-Oriented Reform

Lindbeck (1987) suggests that tax reform forms part of the overall effort of adopting liberalisation policies and 'getting the prices right' so that the market (rather than the government) is left to play the role of allocating resources. In many countries, this would imply the reversal of existing policies such as reducing protectionism, freeing interest rates, and removing tax disincentives to save, invest, and work. It is not clear whether liberalisation would result in higher or lower levels of taxation. The reduction in tariffs may call for new sources of tax revenue, while the uneven distribution of income that arises from reliance on the market may require higher public budgets and taxes for redistribution. On the other hand, liberalisation could lead to lower taxes with the reduction of subsidies to enterprises, greater reliance on users' fees for various types of public services, a reduction of public bureaucracy and higher efficiency in the public sector. There could be increased incentive for private saving, thereby reducing the need for public savings and substantial tax reduction.

3.2.1 Supply Side Economics

The adoption of liberalisation and market-oriented policies has now more or less become the accepted conventional wisdom for economists. In the 1980s some economists advocate market reforms under the guise of 'supply-side economics' which was considered by some as the remedy for the economic problems of the eighties. Supply-side economists believe that free markets, with few exceptions, allocate resources most efficiently. While they accept the existence of pure public goods and some merit goods, they argue that policy makers would not necessarily provide even these goods in the optimum quantity or at the lowest possible costs.

The political philosophy underlying supply-side economics comes from the writings of Downs (1957), Buchanan and Tullock (1969), Niskanen (1971), and Breton (1974). These writers regard governments as essentially inefficient because of their lack of market discipline, and the agents of government have personal objectives that differ from the goals of society. Supply-side economists maintain those government regulations that are aimed at protecting consumers and workers distort relative prices and should be eliminated to improve resource allocation in the economy. Most welfare and entitlement programmes as well as high personal income tax discourage work effort. The reduction of these distortions would encourage savings and production by allowing the economic incentives of a free market to work.

The basic propositions of supply-side economics are not new. In a sense, supply-side economics that emphasises the objective of efficient allocation of resources and the importance of negative substitution effects of government economic policies are beliefs held in mainstream classical and neo-classical economics. The merits of adopting the supply-side approach in development economics are discussed by Peter Bauer (Bauer 1957; Bauer and Yamey 1957) even before this approach was 'popularised' in the 1970s.

Gandhi (1987) notes that the difference of this 'new' approach is the conviction by popular supply-side economists[13] that a substantial reduction of tax burdens, in general, and the rates of income tax, in particular, will have significant effects on stimulating output and growth rates. The great importance placed on nominal marginal income tax rates by supply-siders is a reaction to the traditional literature on taxation that gives an overwhelming bias towards equity and the accentuation of the progressive income tax systems in recent years. Popular supply-side economists claim that the negative substitution effects of income taxes are extremely high. As summarised by Feldstein (1986: 27)[14] a reduction in marginal income tax rates is believed to result in 'rapid growth, dramatic increases in tax revenue, a sharp rise in saving, and a relatively painless reduction in inflation.' The reduction in marginal income tax rates will lead to a change in the economic behaviour of households and businesses in favour of work, savings, and productive investments and against leisure, consumption, and unproductive investment.

An excellent assessment of the relevance of the popular supply-side economics to developing countries is given in Gandhi (1987). Generally, it was found that the tax structures of most developing countries depend more on commodity taxes than on

[13] Popular supply-side economics have caught the public attention since the mid-1970s and been the subject of major debate in the United States and other developed countries. Unlike the basic supply-side position of the classical and neo-classical economists, proponents of popular supply-side economics made wide-ranging claims on the efficacy of efficiency-enhancing government economic policies and income tax policies. The writers on popular supply-side economics include Laffer and Seymour (1979), Meyer (1981), Bartlett (1982), Fink (1982), Hailstones (1982), Roberts (1982, 1984), Guilder (1981), and Canto, Joines, and Laffer (1983).

[14] He does not believe in what is perceived as rather extravagent claims of the popular supply-siders.

income taxes. Very generous tax incentives and tax reliefs are given to encourage savings and investment. The income taxes rates in these countries are much too low for the Laffer curve to be relevant. For developing countries to reach their full growth potential, they would need to go beyond the issues of marginal rates of income taxes, which are maintained by popular supply-siders as being of key importance. They need to reform their entire tax system to increase efficiency.

4. EXPERIENCE OF DEVELOPING COUNTRIES IN TAX REFORMS

In recent years, many developing countries have undertaken tax reforms that vary in scope, context, substance, and timing. For some countries, the reforms set in place effective and viable tax systems that survive for many years. A notable example is the Japanese tax reform packages of 1949-50 that were based on the recommendations of a team led by Carl Shoup.[15] For some other countries, the reforms were short-lived or efforts had not proceeded beyond the proposal stage. The comprehensive reform effort in Bolivia was aborted in 1976-77, while the expenditure taxes proposed for India and Sri Lanka were discarded because of unsatisfactory performance.

4.1 Scope

Tax reforms can vary in breadth and scope. Many tax reforms, especially the early post war reforms, are concerned with changes in tax structure, but this is not a sufficient condition for successful reform in developing countries. There is a need to introduce changes to the tax system to address problems with tax administration and tax compliance. As noted by Gillis (1989), tax reform can be comprehensive in encompassing most or all important revenue sources, or efforts can be partial by being confined to one or two tax sources.[16]

Among the very first countries to adopt a comprehensive post-war tax reform was Japan (1949-50) which tried to rebuilt itself after the war (Shoup et al.,1949). The reform package involved improving the entire tax system to make income taxation as the basic

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[15] Shoup had teamed up with Musgrave and organised innovative reform packages for Liberia, Venezuela (Shoup). Colombia, Korea, Taiwan, and Bolivia (Musgrave).

[16] Gillis (1989: 11) considers a tax reform to be partial if it involves one or two tax sources affecting less than maybe a third of collections.

source of revenue in Japan, raising the level of tax sophistication, and improving tax administration (Pechman and Kaizuka 1976: 321). Indonesia enacted comprehensive tax reforms in the mid-1980s to the entire tax system that had become inordinately complex. Jamaica reformed its taxes to simplify the tax system and minimises the adverse effects of incentives. Its complicated, narrowly based income tax was replaced with a broadly based, single-rate tax (Bahl 1989). Several countries in Latin America drew up proposals for major tax reforms as well. They include Columbia, which was based on the proposals of the classic Musgrave Report (Musgrave and Gillis 1971), Venezuela (Shoup 1959), Chile (Harberger 1989), and Bolivia (Musgrave *et al.* 1981; Gillis, 1989). Other countries that have attempted comprehensive tax reforms are Liberia (Shoup 1970), and Pakistan (National Tax Reform Commission,1986).

Instead of adopting comprehensive reform, countries may undertake tax adjustments or reform their tax system partially by introducing one or two taxes to replace the existing ones. India (Kaldor 1956) and Sri Lanka (Kaldor 1960; Jenkins 1989) attempted to introduce a direct tax on expenditure but the proposal was later abandoned. Brazil (Shoup 1965) and Uruguay (Harberger 1989) were among the first to introduce value-added taxes (VAT) extending through the retail level which was later adopted in twenty other developing countries during 1970-86 (Casanegra 1986). Gillis (1989) notes that virtually every developing country that has enacted sales tax reform since 1965 has chosen either the retail type form of VAT[17] or the manufacturer's VAT.[18]

4.2 Context, Substance and Timing

Countries have adopted a variety of reforms to rectify weaknesses in the tax system and meet certain goals, such as revenue, equity and resource allocation. Tax reforms are often motivated by the need to raise revenue in order to meet increasing public sector expenditure commitment or overcome a financial crisis. The partial reforms in Colombia in 1965-66 and Peru in 1968 were motivated by a financial crisis, while

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17 Used in practically all Western European nations. According to Gillis (1989), twenty countries switched from cruder forms of sales tax to value-added taxes extending through the retail stage. These include Ecuador (1970); Bolivia (1973); Chile, Costa Rica, and Argentina (1975); Honduras (1976); Korea and Panama (1977); Mexico (1980); Peru, Nicaragua, and Haiti (1982); Guatemala (1983); Colombia, Dominican Republic, and Madagascar (1984); Turkey (1985); Niger, Portugal, and Taiwan (1986).

18 Enacted in Colombia in 1966, Indonesia in 1984, and proposed for Pakistan in 1987 (Gillis, 1989).

those adopted for Venezuela in 1958-59 and Colombia in 1968-70 were meant to raise revenue to finance new expenditure on education and health (Gillis, 1989). However, revenue enhancement was not always the primary consideration. For instance, the post-war reform programmes for Japan did not place revenue enhancement high on the agenda. Japan was in a state of near ruin and the priority was the creation and operation of a sound tax system (Shoup 1949; 1989). The Indonesian reform was motivated by the need to enhance the size and 'elasticity' of non-oil revenue. The policies are intended to be revenue neutral in the short run, although the simplification of the tax system is expected to increase the effectiveness of tax administration and compliance and generate increased revenue in the long run (Gillis 1989). The Indonesian experience has shown that the circumstances of the country should be central in organising and carrying out the tax reform. As a strategy for improving the acceptability and success of the tax reform, foreign consultants kept a low profile while domestic expertise and policy makers were involved from the beginning in the formulation of the reform package.

The earlier post war efforts at tax reforms in developing countries place great emphasis on income distribution and progressivity of the tax system (see Kaldor 1956, 1960; Shoup, 1959, 1970; Musgrave and Gillis 1971). By mid-1970s there was growing scepticism on the efficacy of taxes to bring about income redistribution. According to the World Bank (1988) taxes in developing countries often fail badly in terms of horizontal equity because of poor tax coverage and arbitrary enforcement. Some formal activities may be captured by the tax net, but not the informal or hard-to-tax formal activities, thereby undermining the system's credibility and the willingness of the taxpayer to comply. The tax systems are also not successful in vertical equity despite the highly progressive rate structures. The World Bank asserts that the role of taxes in promoting equity lies more in the revenue that is raised for distributive spending, especially for poverty alleviation, rather than the structure of taxation *per se*.

Tax provisions have traditionally been used by governments to guide private firms and individuals either towards or away from particular investments and activities.[19] Among some of the countries that relied heavily upon tax incentives to promote growth and development through the 1960s into the 1980s are Bolivia, Brazil, Colombia, Ghana,

[19] For surveys of tax incentives, see Shah and Toye (1978); Heller and Kauffman (1963); Lent (1967).

Indonesia, Liberia, Jamaica, Malaysia, Nigeria, Pakistan, Singapore, Sri Lanka, Sudan, Venezuela, and Turkey (Gillis, 1989; Shah and Toye, 1978). There are at least four strategies that can be used in subsidising investments through the granting of investment incentives: (a) subsidise all new firms or all new investments; (b) limit subsidies to all firms within a well-defined set of industries; (c) subsidise firms which meet a set of criteria; and (d) restrict subsidies to firms that would not invest without a subsidy (Usher 1977).

Despite the pervasive use of tax incentives, there have been few attempts to evaluate the effectiveness of these incentives (Bird and Oldman 1990). The evidence of the effectiveness of incentives on investments in developing countries remains unclear. Shah and Toye (1978) conclude that 'their impact is either slight or unknown' and the persistence of their use is influenced by political economy. According to Gillis (1989), later reforms in the 1970s and 1980s have moved towards tax neutrality in view of the scepticism of the efficacy of tax incentives. For instance, the Indonesian reform of 1983-84 abolished all special tax incentive provisions, while the Bolivian reforms of 1986 and the Jamaican reforms of 1986-87 were addressed toward 'getting prices right'. The Bolivian reform shifted away from incentives and adopted a uniform rate of VAT with no exemptions, while the Jamaican reform abolished 16 special purpose tax credits in the personal income tax and curtailed company tax incentives for agricultural and industrial firms (Gillis 1989; Bahl 1989).

Timing for the adoption of tax reforms can be contemporaneous, phased or successive. Governments that attempt to adopt all the reform provisions at once, in stages or enact reform measures on a tax-by-tax basis over a period of time. For instance, the tax reform in Colombia, the Republic of Korea, and Turkey was a long drawn out period, while major changes in the tax system for Indonesia and Malawi were implemented quickly. Gillis (1989) argues that there is an advantage of implementing comprehensive tax reform contemporaneously since this reduces the danger of revenue dislocation and neutralises the opposition from interest groups who might lose in one element of the tax reform but gain in another. The disadvantage of contemporaneous reform is the short time available to the tax administration to deal with the changes in tax laws and administrative procedures.

Colombia has had major tax reforms in 1953, 1961, 1974 and 1986, which suggest that tax reform is inherently neither a continuous nor a once for all process, but a periodic one. Tax systems must change to accommodate fundamental changes in economic and political environment of developing countries (World Bank 1988: Box 4.7).

5. LESSONS AND TRENDS

Despite the variety of reforms adopted in developing countries, some coherent themes emerge about the current status of tax reforms and point towards the future directions in the coming years. A comprehensive discussion on the experiences of developing countries at tax reform transpired at the Conference of Tax Policy in Developing Countries organised by the World Bank.[20] Some common themes and important lessons that emerged may be summarised as follows:

1. *Using the VAT.* The VAT is the preferred instrument for most developing countries because of its strengths in revenue enhancement, tax neutrality, vertical equity and improving the collection of other taxes. From the experiences of countries with VAT, the following points should be noted: (a) pre-retail VATs are not worth adopting because of distortion and administrative complexities; (b) all services, except health care, education, social welfare, banking, and insurance, should be included in the base; (c) rate differentiation should be minimised, although the poor should be protected; (d) VAT is an ideal tax for large, integrated economies with sophisticated production and distribution channels and is less suitable for small, island-type economies with narrow manufacturing base and large cross-border trade.

2. *Broadening tax bases.* The base of existing taxes should be broadened to enhance revenue and improve the simplicity, neutrality, and equity of the tax system. The lack of success in implementing tax reforms is due to selective

[20] World Bank Conference on Tax policy in Developing Countries, held in Washington, D.C. , in March 1990. The papers from this conference are published in the *World Bank Economic Review*, Volume 5 September 1991, Number 3.

and lax enforcement, ineffective tax administration, institutional and political difficulties in taxing agricultural incomes, and an overall disenchantment with income taxes as revenue instruments in an evasion-prone environment.

3. *Limiting special tax preference.* The provision of special tax preferences often drains the national treasury. The potential gains of these preferences should be weighted against the potential losses in efficiency and revenue. While there is a role for investment incentives that can offset the corporate tax distortion, attract foreign investment, create employment, promote risk sharing, and correct information asymmetries, the granting of some of these incentives often depends on administrative discretion that discourages potential investors, especially non-residents.

4. *Taxation of financial assets.* Contrary to belief, Chamley (1991) found that the financial sector in many developing countries is heavily taxed if one considers both explicit and implicit taxes. Implicit taxes include seigniorage, reserve requirements, lending targets at non-market rates, interest ceilings combined with inflation. Using a partial equilibrium framework, Chamley argues that most of the incidence of the effective taxation of financial institutions falls on deposits.

5. *Distributional impact of taxation.* Shah and Whalley (1991) argues that developing countries have very different non-tax policies and regulatory environments from industrial countries. When these features are taken into account, they can yield significantly different tax incidence estimates calculated on the assumptions about tax shifting that are used in studies of developed countries.

6. *Taxing multinationals.* The design of tax reform must reflect initial conditions at home and abroad since developing countries are not only constrained by their own institutional settings but also by the tax structure in capital-exporting countries. The taxation of multinationals by a developing country should be examined in terms of the tax regime of the home country, tax havens and conduit countries, and transfer pricing practices. Home country

taxes influence the user cost of capital, while foreign firms in a typical host country face substantial variations in the user cost of capital. The incentive to invest depends upon the effective marginal tax rate, which can differ from an average tax rate concept. In their study of Mexico, Shah and Slemrod (1991) conclude that foreign direct investment (FDI) in Mexico is sensitive to tax regimes in Mexico and in the United States, to the credit status of multinationals, to country credit ratings, and to the regulatory environment.

7. *Improving credibility.* The success of any tax reform depends on the credibility of the tax regime. Establishing business confidence in the credibility of the tax regime requires greater attention to preparation, analysis of reforms, advance consultation, and provision of a reasonable period of adjustment before implementation.

8. *Co-ordinating tax reform.* A co-ordinated reform ensures consistency of individual tax changes with the overall objectives, including revenue enhancement, protection (through custom duties) and economic performance. A reform on reducing tariffs should be accompanied by reform of other indirect taxes to offset potential losses and public revenue.

9. *Considering the political economy.* Tax reform proposals must carefully consider the institutional features and tax administration of each country. When it is difficult to get politicians to commit to comprehensive reforms with medium to long term benefits, having periodic, incremental reforms may be a pragmatic strategy. Where tax evasion is pervasive and the earlier tax preferences are restored after the initial tax reform as a result of political pressure, broadening bases and lowering rates can lead to a tax 'deform'.

10. *Quantitative tools for tax policy analysis.* There is a scope for a quantitative evaluation of the impact of changes in tax structures for economic and political economic analysis. As illustration, Dahl and Mitra (1991) use the applied general equilibrium analysis to address questions in tax policy for Bangladesh, India, and China. They argue that the costliest element of modelling is establishing a consistent data set and the cost should be weighed

against the gains from modelling in producing consistent recommendations for sound policy formulation.

11. *Optimal Taxation.* There is limited scope of adopting the optimal tax theory for developing countries because the optimal commodity tax rule assumes global knowledge of preferences both in the present period and intertemporally, the absence of other tax instruments, and the representative consumer. Once these assumptions are relaxed, the usefulness of the Ramsey Rule is less clear cut. The optimal tax theory can serve as a guide to designing 'optimal tax systems' only if it considers the technology of tax collection, such as the feasibility of tax instruments and the cost of tax administration and compliance (Slemrod, 1990).

12. *Taxation of agricultural land.* Skinner (1991) examines the possibility of replacing distorting taxes on agriculture with land tax. He concludes that a land tax is not necessarily a superior alternative to export taxes for raising federal government revenue, while progressive tax rates on land holdings are nearly impossible to administer. A land tax may be suitable for local government financing though.

6. CONCLUSION

In discussing tax reform in developing countries, this chapter considers the taxation theory, empirical evidence, and political and administrative realities that are required for producing reform proposals that can be implemented successfully. Since the post-war and especially during the 1980s, many developing countries have embarked on tax reforms, which range from comprehensive to partial reforms. The accumulated experience garnered from the reform efforts of a wide range of countries is instructive and has shaped the way development taxation is now approached. This review provides the context and sets the stage for discussions in the later chapters on reforming the Malaysian tax system and its implications on the economy.

Chapter 3

ECONOMIC TRANSFORMATION AND FISCAL REFORM

1. INTRODUCTION

During the last twenty five years, Malaysia enjoyed rapid economic growth and high standard of living despite experiencing two recessions in the last two decades. Its per capita income rose faster than that of the developed countries and most resource-rich Latin American countries which shared similar economic structures. The country has a good track record of sound economic management, high savings and investment, and low inflation. It has successfully reduced poverty and made notable progress in restructuring the society.

Although growth was rapid during the last twenty five years, the economy experienced sharp fluctuations. In addition, it faced problems of poverty and disparities among ethnic groups and regions. In response to changing domestic needs and external circumstances, the Malaysian development policies during the last twenty five years had shifted from one of fiscal activism to fiscal restraint, from an expansionary to a much trimmer public sector, from the government acting as the 'spearhead' of development to the private sector as the engine of growth. Despite the policy shifts, the country maintained a high degree of consistency and effectiveness in policy formulation and implementation. This had enabled Malaysia to overcome its problems and move ahead to its next stage of development in a relatively short time.

This chapter provides an overview of Malaysia's economic performance as well as economic management and fiscal policies since 1970. It gives a historical review of the country's economic development and analyses the underlying reasons for embarking on policy reforms. This discussion is aimed at providing the background and socio-economic context for our analysis on the tax system, which will be pursued in the later chapters. In the next section, we discuss the four phases in Malaysia's economic transformation and accompanying development policies. The third section examines public expenditure and revenue for the last twenty five years, while the fourth section discusses the policies for the nineties and their implications on fiscal policies.

2. ECONOMIC TRANSFORMATION

For analytical purpose, it may be useful to examine the Malaysian economy in terms of four phases of business cycle and economic management policies. The first phase (1970 to 1979) is a period of high growth accompanied with the adoption of the New Economic Policy. The second phase (1980 to 1984) saw economic boom amidst the spiralling of public expenditure and debts that made it necessary for the country to re-orientate its programmes and fiscal policies. In the third phase (1985 to 1986), the country experienced the worst recession since independence. The fourth phase (1987 onwards) marked the rapid turnaround in the economy that placed it on a path of high economic growth.

2.1 Phase 1 High Growth With Equity (1970-79)

2.1.1 Adoption of the New Economic Policy

It would be useful to provide a brief background to the formulation of the New Economic Policy that was to become the watershed in Malaysia's socioeconomic policies. In the 1960s, Malaysia was one of the most prosperous Southeast Asian countries, with an economic growth rate averaging 6 percent per year. It had just attained independence and was resource rich, being the world's leading exporter of rubber and tin. Despite economic success at the aggregate level, poverty was prevalent and disparities among different segments of society were widening. The incidence of poverty was disproportionately high among the Malays, whose per capita income was only half that of the Chinese and two-thirds of the national average. Clearly, the benefits of economic growth had not 'trickled down' as was believed by the fashionable development theories at that time, and dissatisfaction of the people was lurking beneath the calm surface of fragile communal stability. The inter-ethnic dissatisfaction was heightened by preelection political campaigns of 1969 that touched on the raw nerves of racial sensitivities. These culminated in the outbreaks of racial conflicts in major towns of the peninsula during the aftermath of the national elections, a traumatic event known as 'May 13'.

This inter-ethnic violence sent shock waves down the country. Parliament was suspended and a state of emergency was declared. The National Operations Council was formed to govern the country. In 1971 the New Economic Policy (NEP) was formulated and pronounced in the Second Malaysia Plan.[1] Since background papers on the formulation of NEP are not available in the public domain, it is probably fair to say that the policy makers realised that the communal riots represented an alarming fissure in the Malaysian society, which was composed of three major races, each with its own language and dialects, customs and traditions, religious beliefs, dietary preferences and habits. Even occupations and locations were identified with race. There are ample examples of societies with more homogenous characteristics which were torn apart by years of political tension and conflict. For a society that was so differently constituted, it became even more crucial for the situation to be handled with great care and foresight. If handled well, the country could be on the road of national reconciliation. Even more, it had every potential of becoming a vibrant, dynamic society, combining the strengths of different ethnic groups and where the inter-ethnic differences could even become a source of creative stimulation and enterprise. However, if handled badly, this would result in a volatile cocktail that could lead to the disruption and eventual break-up of the Malaysian nation.

Accordingly, national unity was elevated into the over-riding objective of national development efforts. The strategies to achieve this national objective were two pronged: poverty eradication and restructuring of society. This pronouncement was an acknowledgement that certain affirmative actions were needed to redress the imbalances in society. It was also a recognition that the pursuit of economic growth by itself was no

[1] The Malaysia Plans are medium-term five year development plans encompassing all aspects of socioeconomic development of the country. Development expenditure allocations made at the start of the plan are revised in the midterm review. Malaysia's development in the 1970s was covered by the Second Malaysia Plan (1971-75) and the Third Malaysia Plan (1976-80), while developments in the 1980s was under the Fourth Malaysia Plan (1981-85) and the Fifth Malaysia Plan (1986-90). These four plans were guided by the long term First Outline Perspective Plan (1971-90). The Sixth Malaysia Plan (1991-95) and the Seventh Malaysia Plan (1996-2000) contain policies, strategies and programmes for the nineties and are directed towards achieving the overall objectives of the Second Outline Perspective Plan (1990-2000).

longer considered to be adequate or sufficient in developmental terms. In 1971 Malaysia decided that its economic growth must be coupled with equity. This was a substantial advance of the policies of many developing countries where discussions were about 'trade-offs' between growth and equity (see Killick, 1983:151-153). Later, the influential World Bank's study *Redistribution With Growth* (Chenery *et al.*, 1974) called for a paradigm shift in the approach to development. In the introduction of the book, Chenery noted that despite a decade of rapid growth in underdeveloped countries during the sixties, this growth had been very unequally distributed, thereby calling into question the very idea of aggregate growth as a social objective.

Given the set of circumstances the policy was conceived and formulated, there was a single-minded commitment at all levels of government in implementing the NEP strategies, which was itself a basic ingredient for the policy's success. Many policies and targets were set for this purpose, while special entries for poverty and restructuring programmes were made for the allocation of public funds. The NEP also called for a bigger pro-active role of government to rectify what might seem to be 'market failures'. In the implementation of this policy, however, two provisos were made clear: 1) that no segment of society should feel deprived in pursuit of distributional goals; and 2) that the policies were to be implemented within the context of rapid economic growth.

The net result of NEP was a major improvement in the transformation of Malaysian society. There was greater equality among different communities than ever before and incidence of poverty was reduced to a low level. The wide ranging support by voters from all communities for the ruling coalition party after two decades of NEP implementation might be taken to be an indication of the support by the general population for these policies. However, these policies also brought about the rapid growth of the public sector, not only in general administration but also in commercial and other activities. The issues of the inefficiency and poor performance of public enterprises in most countries are well known since they had to fulfil a multiplicity of potentially conflicting objectives (see Killick, 1983: 277-301). The problem of the rapid growth of Malaysia's public sector was brought to a head barely one decade later when the deterioration of budgetary deficits and recession necessitated a policy reversal to this trend.

2.1.2 Economic Performance

The Malaysian economy performed well during the seventies, with the exception of the recession in 1975. Gross domestic product (GDP) grew at a sustained average rate of 7.8 percent per annum, while per capital income rose to RM3,738 in 1980.[2] Despite experiencing economic fluctuations, the country registered rapid growth given its wealth in natural resources, especially large reserves of arable land, as well as its successful adoption of the export-oriented growth strategy, prudent economic and financial management, and stable social and political institutions. During the seventies, the rubber sector recorded sharp productivity increases, which cushioned the effects of steep price declines. As part of diversifying the economy, palm oil production and the extraction of timber expanded, while the country promoted the rapidly growing manufacturing sector that was increasingly export-oriented.

As an open economy in which imports and exports each constituted about 50 percent of the GDP in 1971-80, the Malaysian economic performance faced the vagaries of the world growth trend. The peaks and troughs in economic growth generally correspond to movements in the terms of trade (see Figures 3.1 and 3.2). This pattern is particularly apparent during the recessions in 1975 and 1985-86 as well as growth since 1976. There was a sharp increase in the terms of trade between 1975-79 when the prices of crude oil, tin, palm oil, rubber, and sawlogs all rose simultaneously (Figures 3.3-3.5). The past investments in oil palm cultivation in estates and land development schemes contributed to the increased production and export of the crop. In value terms, the export share of petroleum grew dramatically, up from 9 percent in 1975 to 17 percent in 1979. During this period, the manufacturing sector grew at 11.3 percent per annum, while manufactured exports rose by 25 percent per annum.

2 RM is 'Ringgit Malaysia', the Malaysian currency. As an indication, the exchange rate for £1.00 was RM5.30 in 1980 and RM3.92 in 1995.

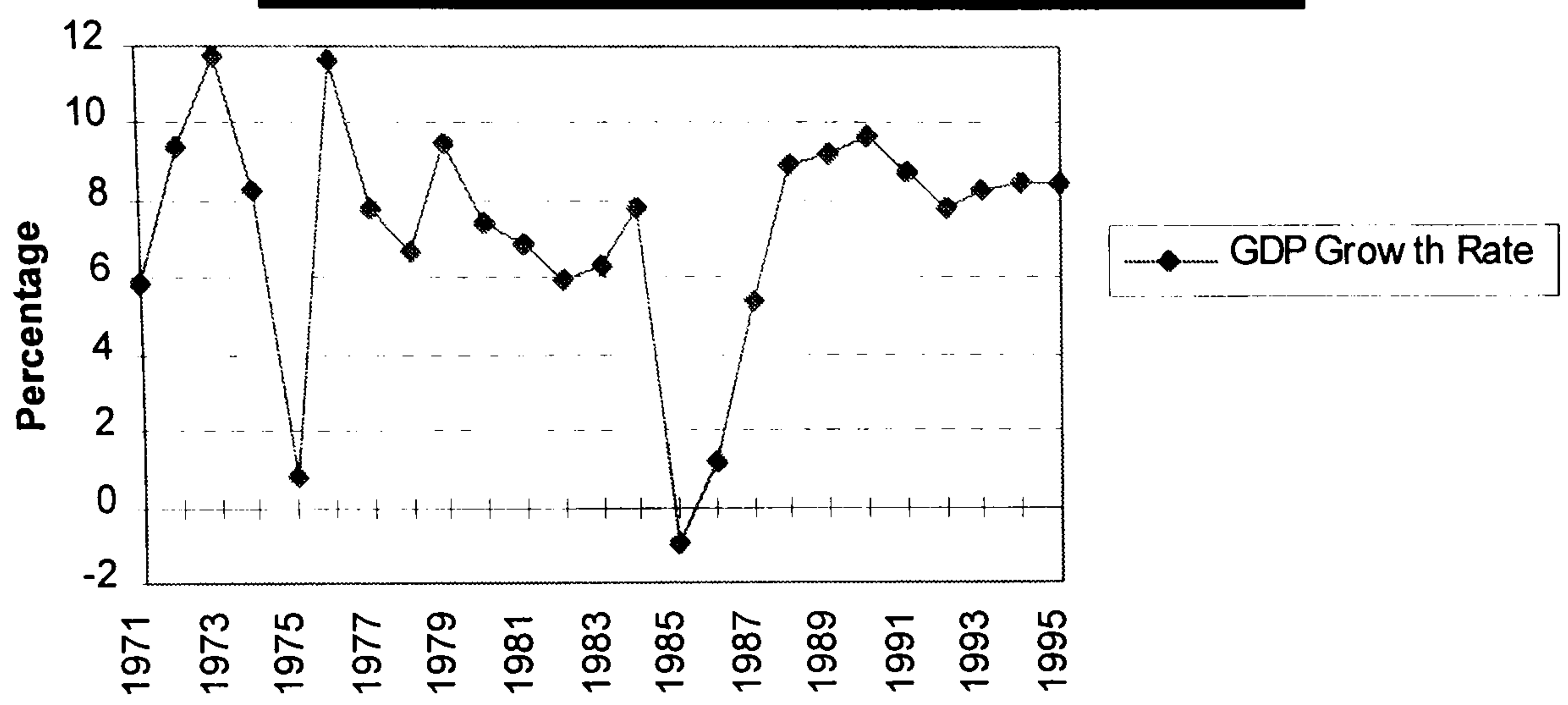
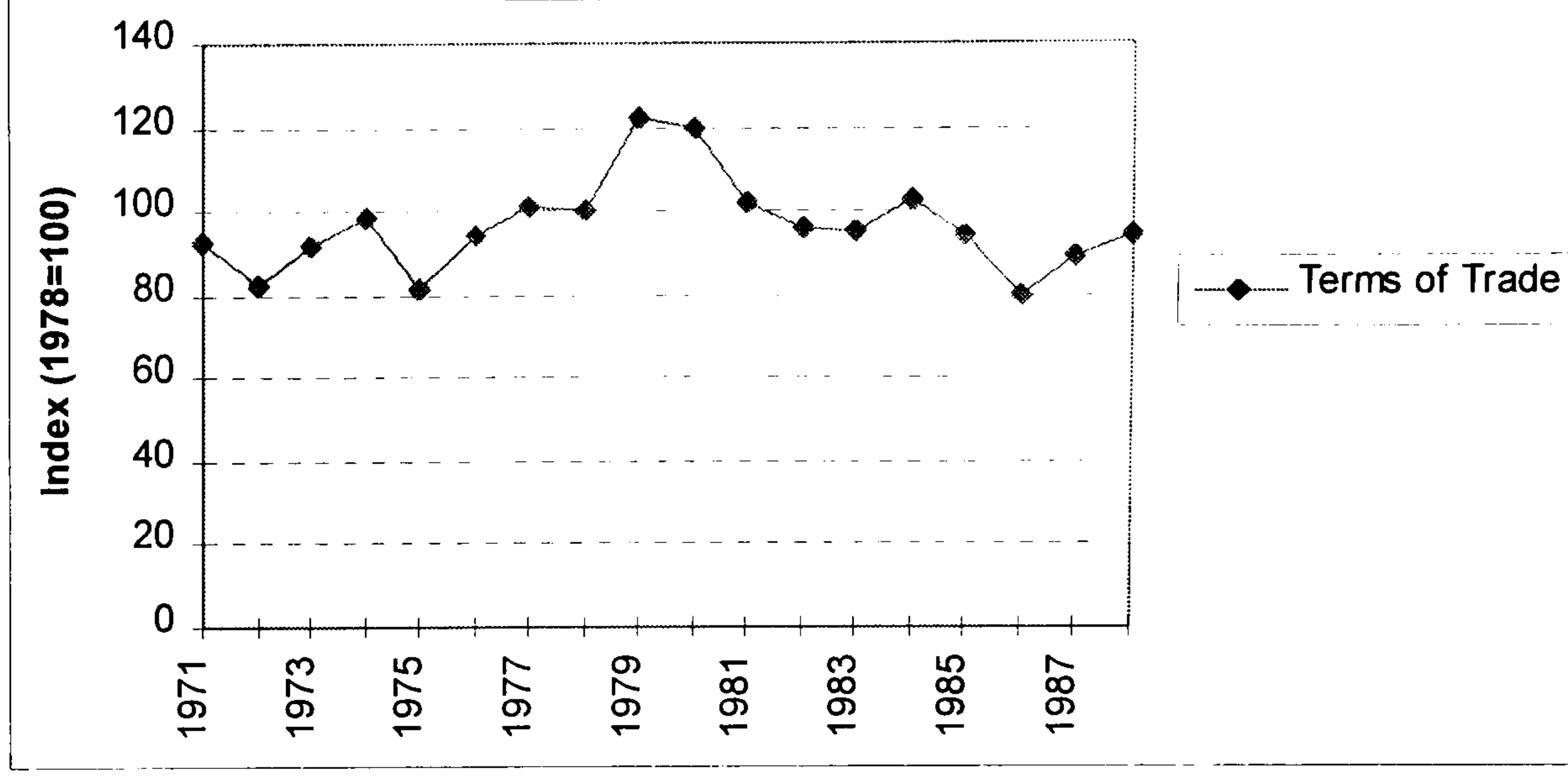


Figure 3.1 Growth of Gross Domestic Product (1978 Prices)



Figue 3.2 Terms of Trade

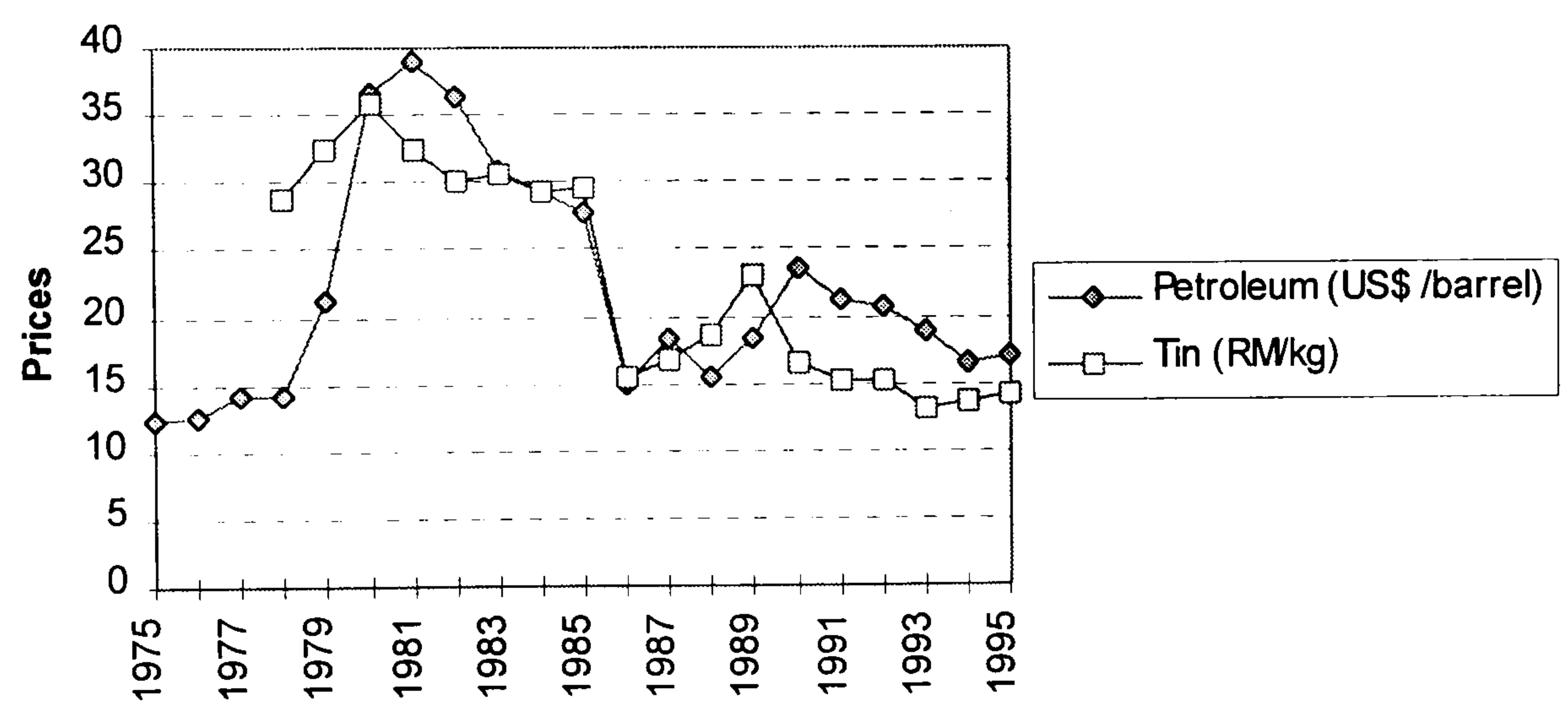


Figure 3.3 Export Prices of Petroleum and Tin

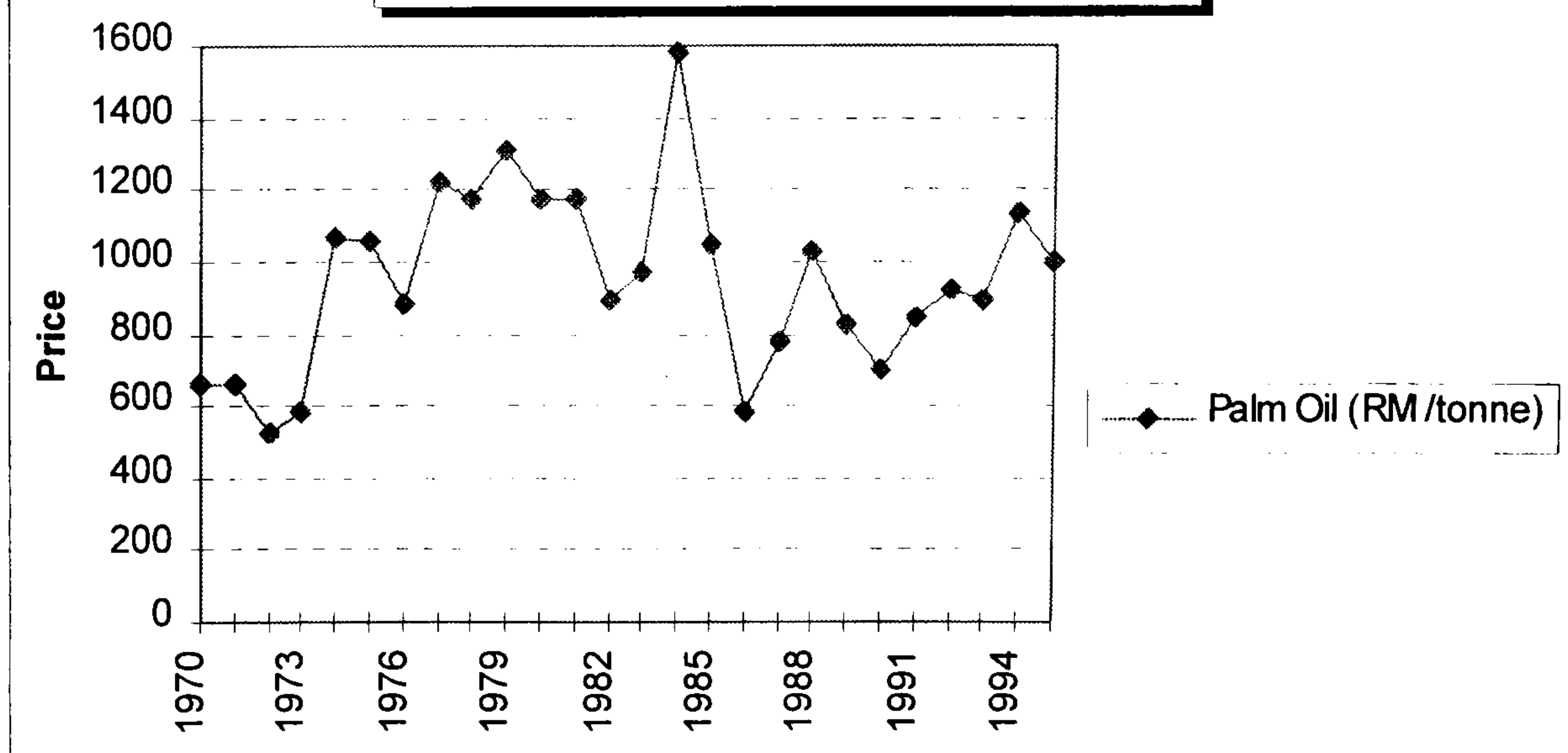


Figure 3.4 Export Prices of Palm Oil

Figure 3.5 Export Prices of Rubber and Sawlogs

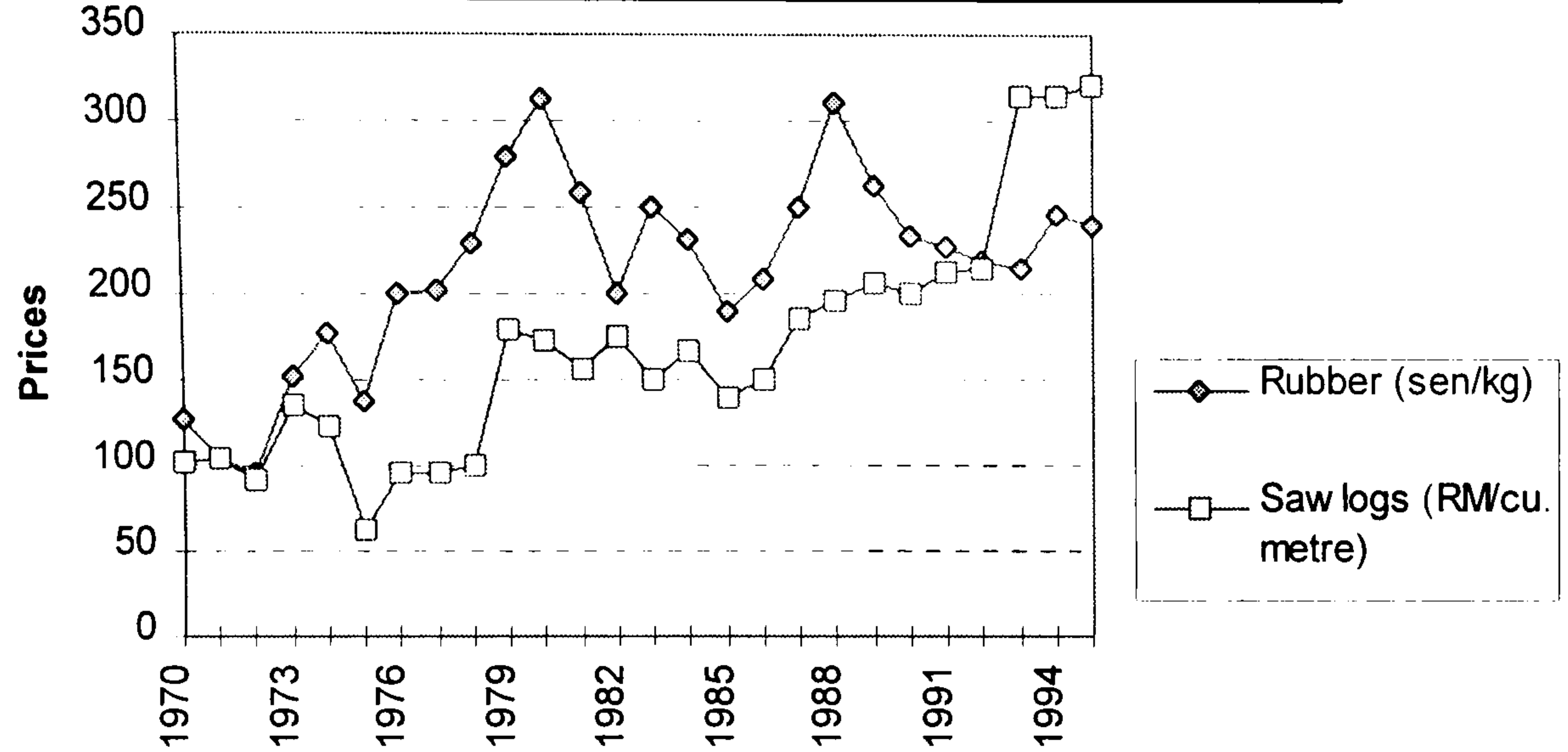


Figure 3.6 Value of Primary Exports

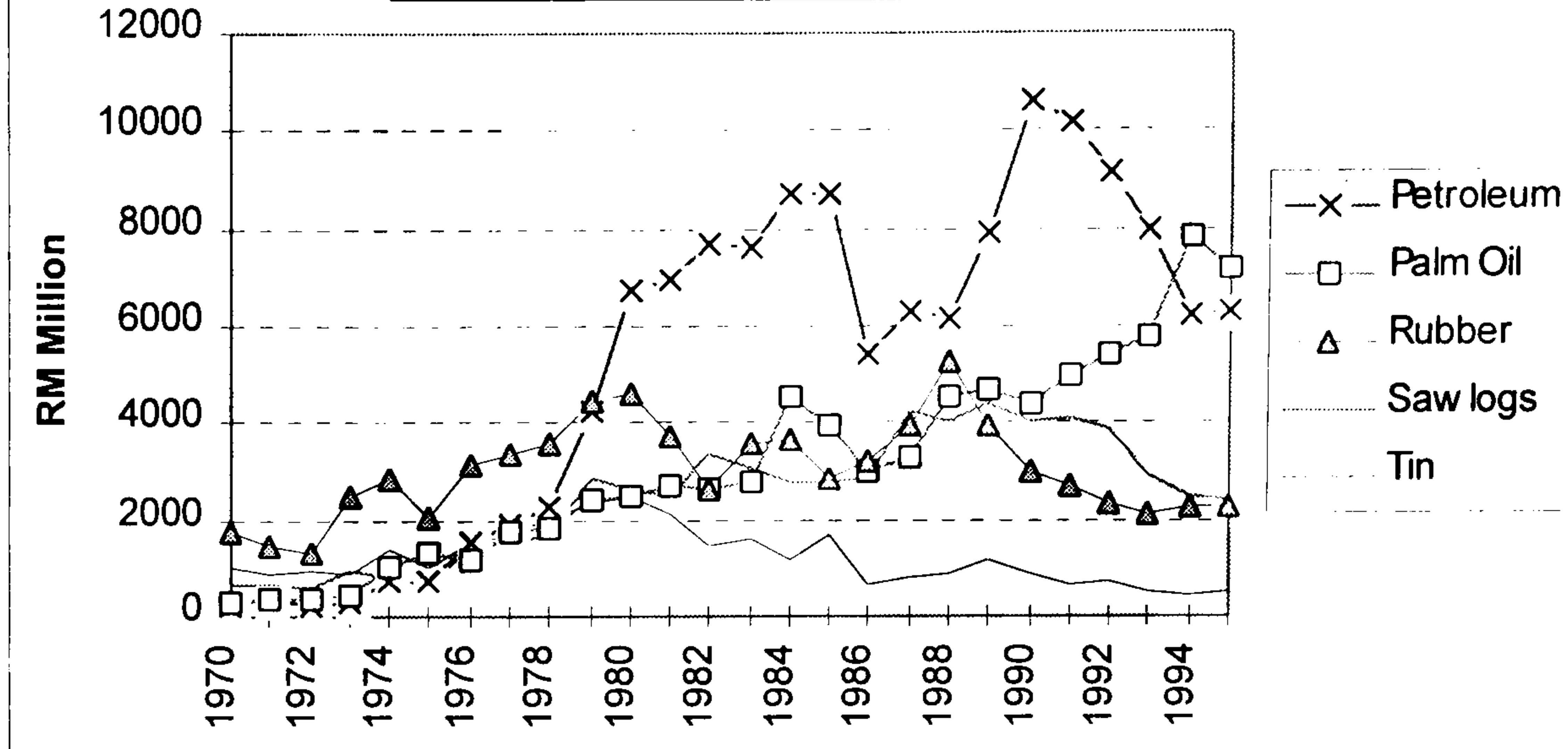


Figure 3.7 Merchandise Account and Services Account

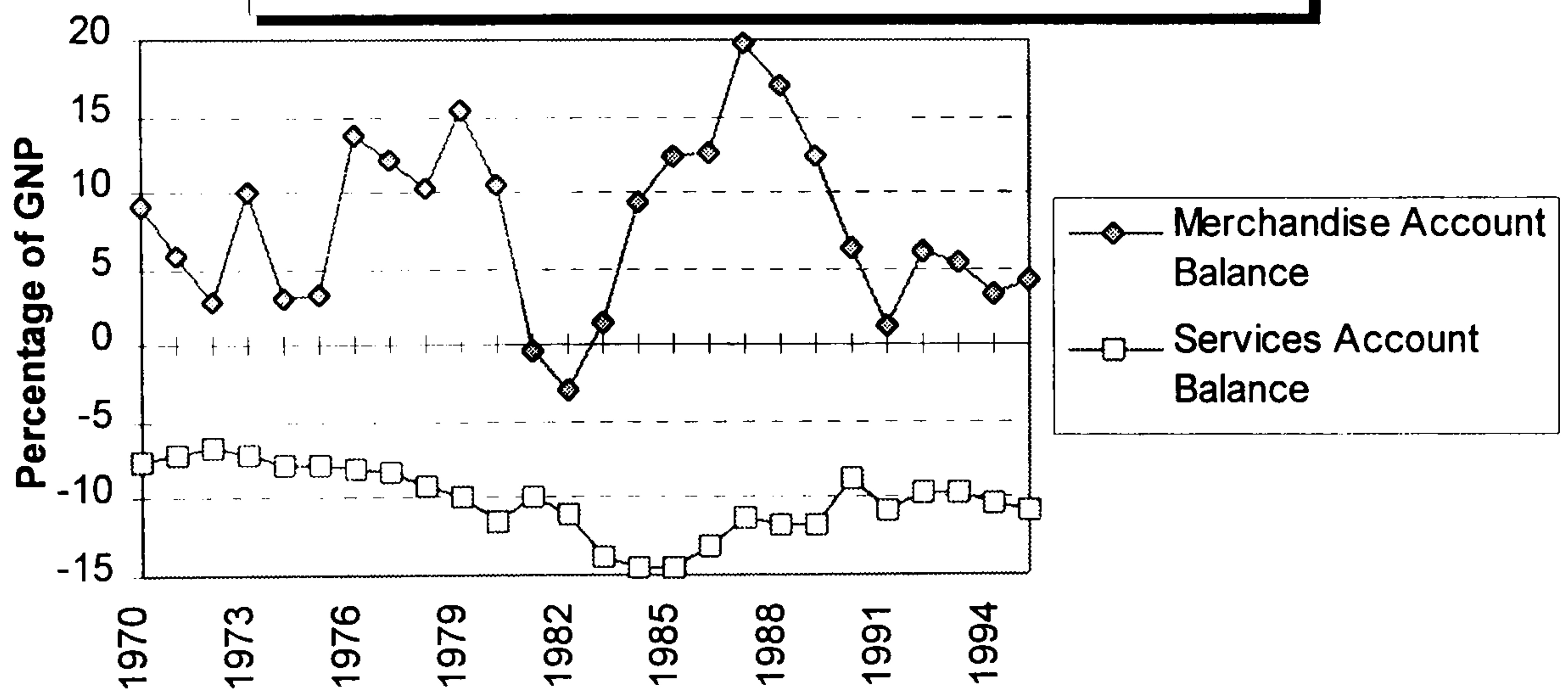
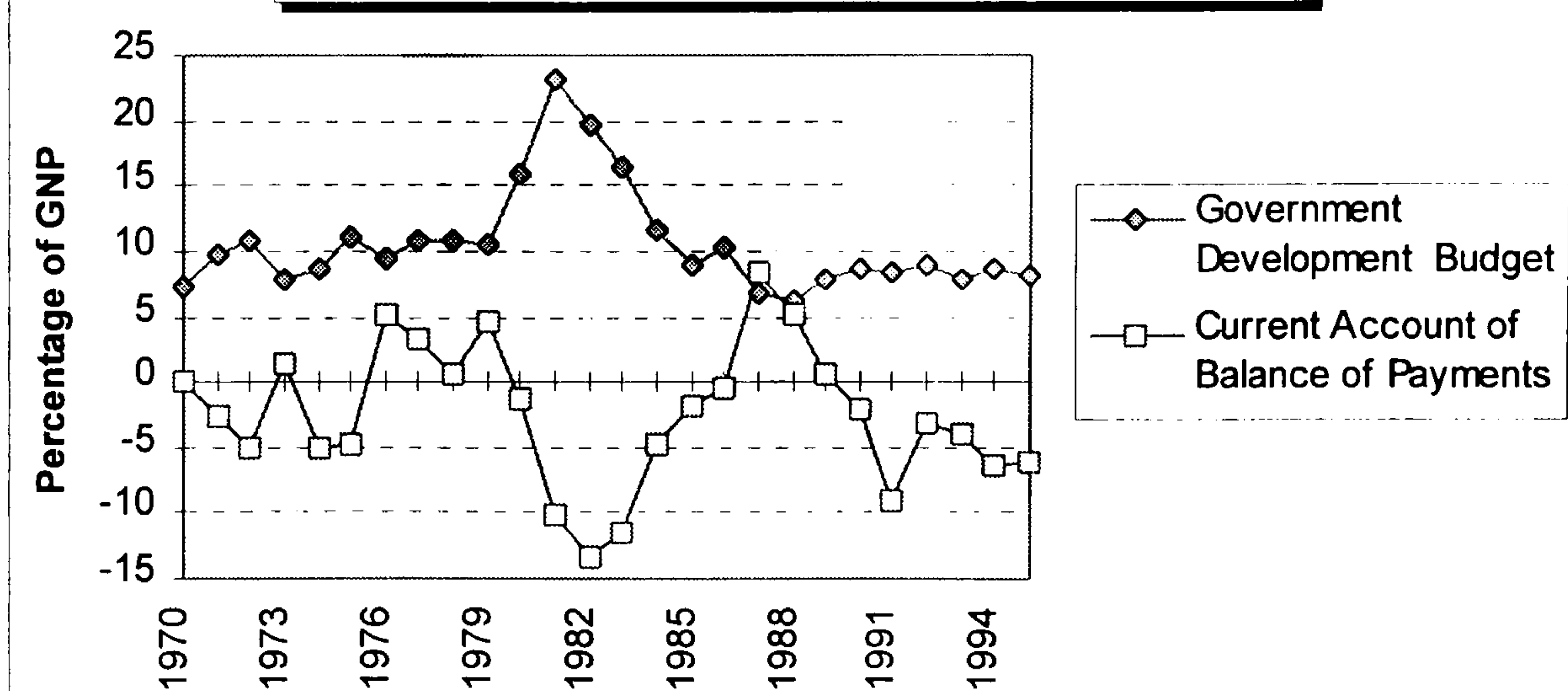


Figure 3.8 Current Account and Development Expenditure



2.2 Phase II Boom With Growing Macro Imbalances (1980-84)

After the economic upswing in the late seventies, the Malaysian economy entered a new phase of its development in the 1980s. Its terms of trade[3] peaked towards the middle of 1980 and then took a sharp decline that continued until 1986, with a brief respite in 1984. The decline in the terms of trade was around 20 percent, while the slow-down in the international economic activities as a result of the recession in OECD countries reduced the demand for Malaysian exports. On the supply side, the real growth of important agricultural commodities, especially rubber and timber, had reached a plateau, although this was compensated by increased exploitation of petroleum and natural gas (Figure 3.6).

The declining terms of trade reduced the scope of private investment. The slow-down in demand, coupled with the decline in commodity prices, gave rise to a deterioration in the merchandise account and the current account of the balance of payments (Figures 3.7-3.8). In response to the depressed external sector, the government adopted an accelerated public investment and expenditure programme in 1980 and 1981 to boost economic activity and sustain real growth at a high level (Figure 3.9). While some sectors were in the doldrums, employment in government services expanded rapidly during 1980-82 (Figure 3.10). The counter-cyclical fiscal policy was in anticipation of a rebound in petroleum prices and a quick recovery of OECD growth. Although this sheltered the economy against the international recession, the temporary relief was at a cost of an inflated current account deficit.

The strong growth in the domestic economy as a result of expansionary fiscal policy and the tight labour market imposed pressure on the domestic price level. From an inflation rate of 3.6 percent in 1979, consumer prices shot up and peaked at 9.7 percent in 1981 before falling rapidly to 0.4 percent in 1985 (Figure 3.11). The anti-inflation measures include promotion of domestic savings and tightening conditions on consumption credit. In addition, the government continued with the tight monetary

[3] Terms of trade index is calculated by dividing the export price index with the import price index.

Figure 3.9 Change in Government Expenditure

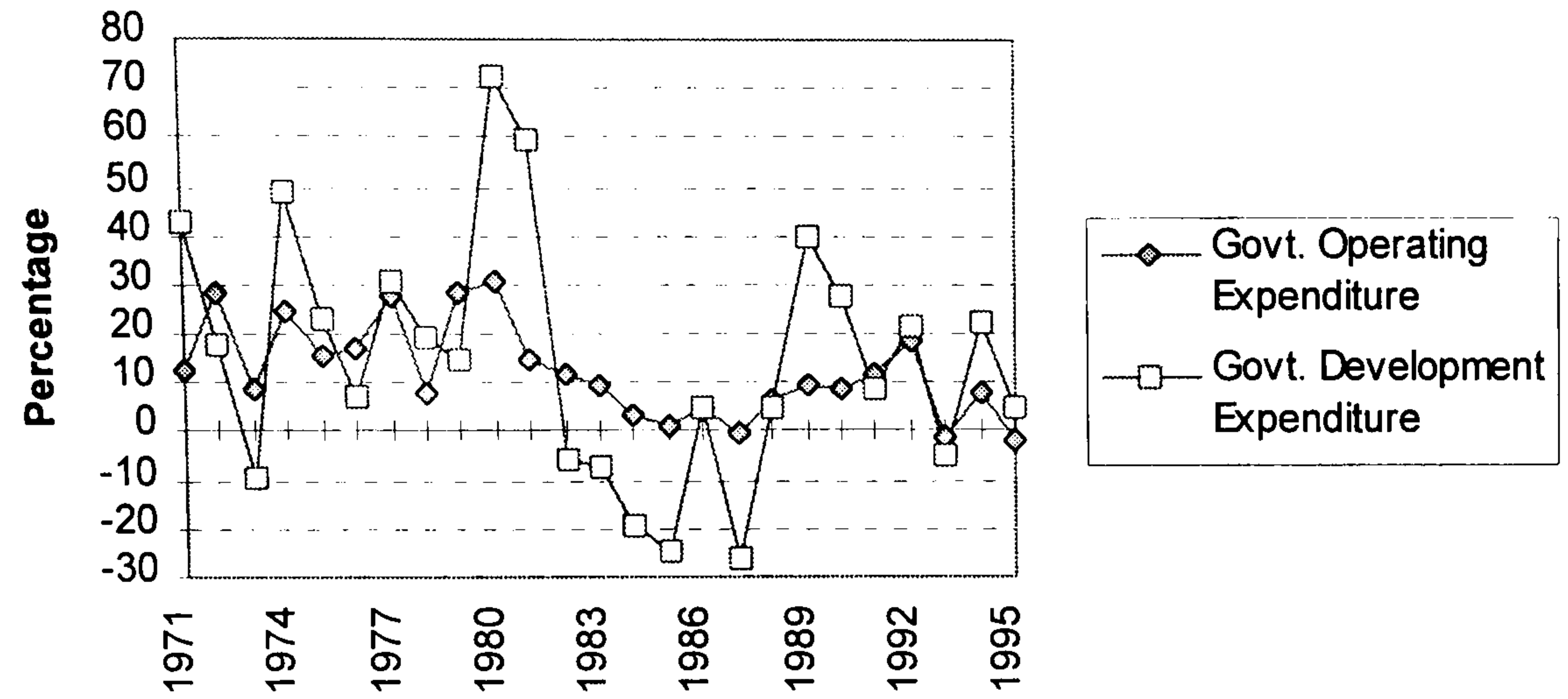


Figure 3.10 Growth of Government Employment

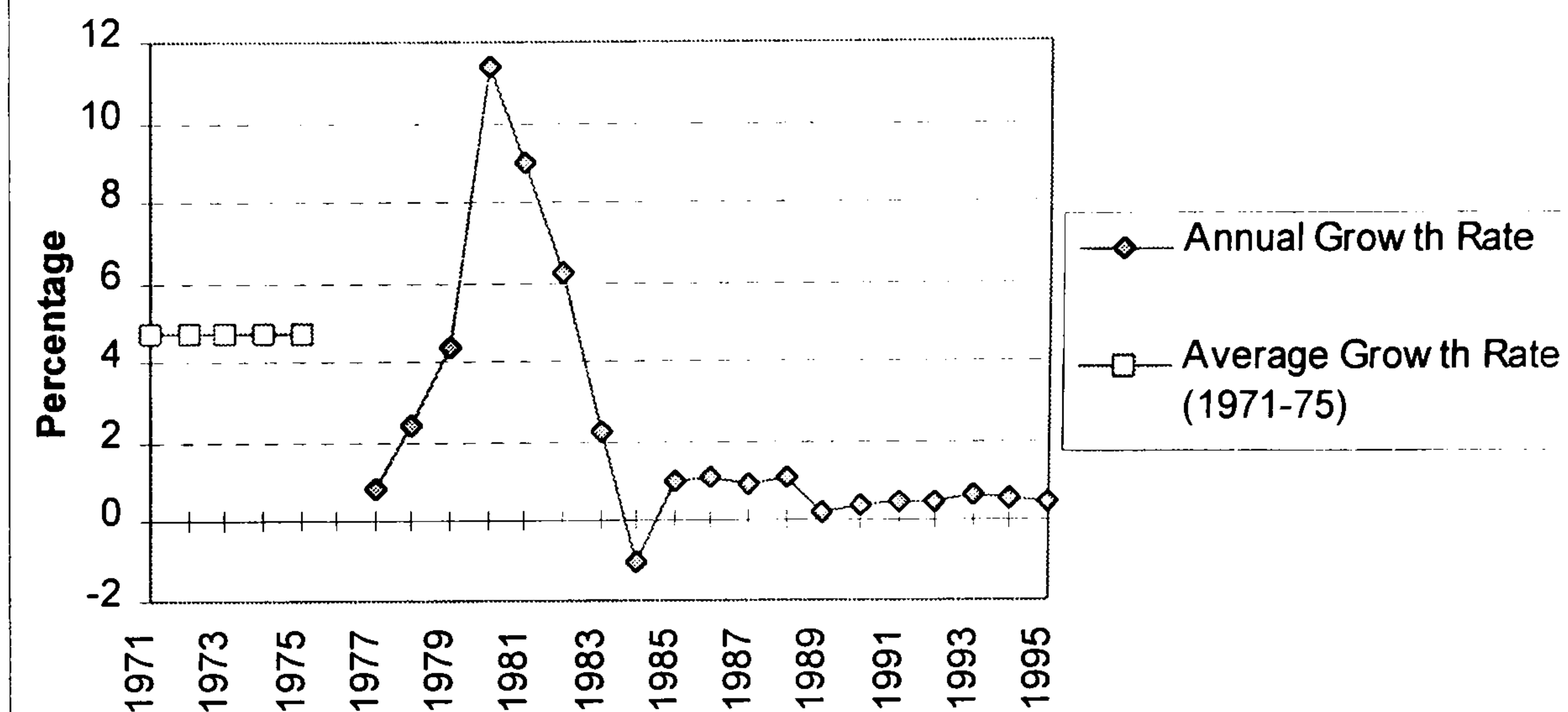


Figure 3.11 Inflation and Interest Rate

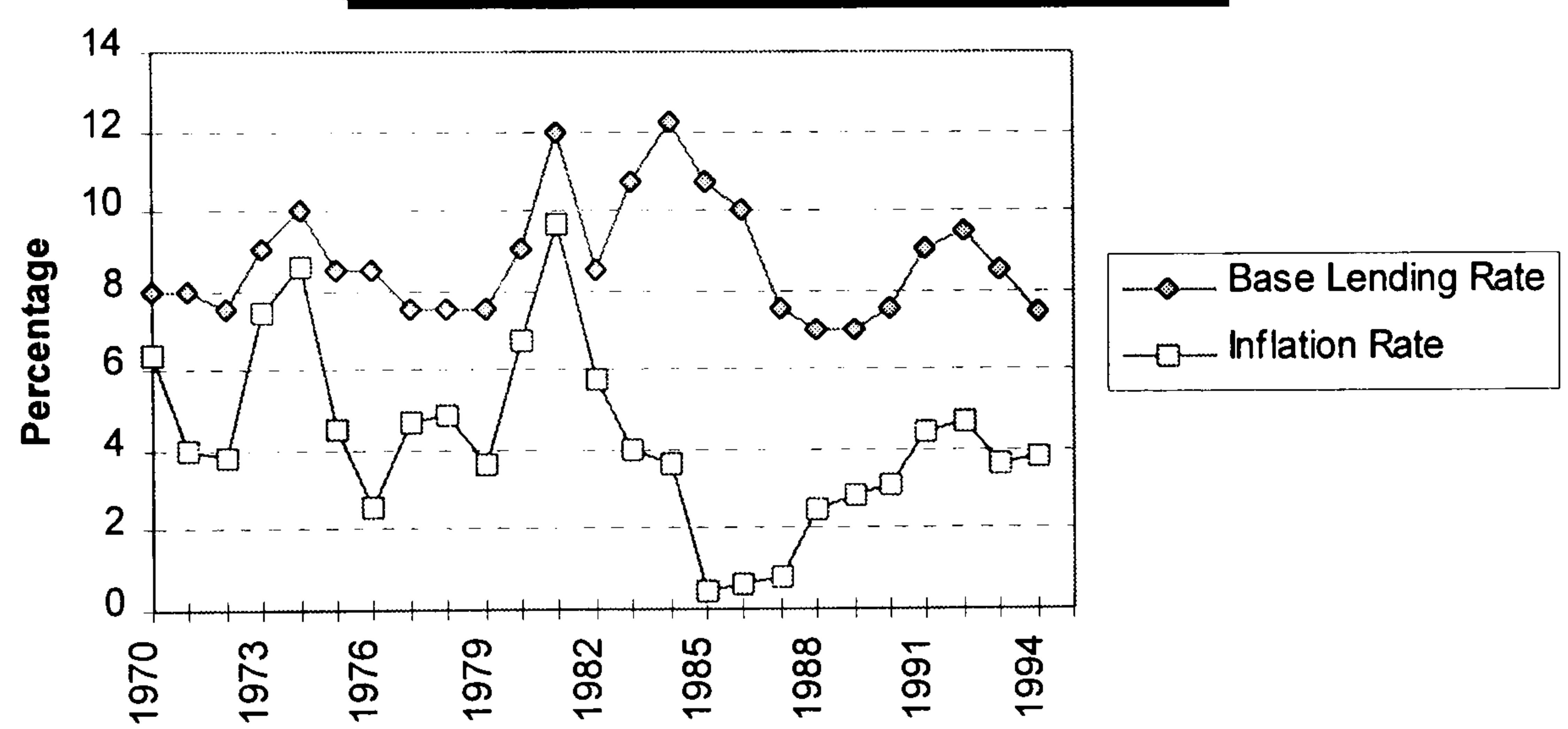


Figure 3.12 Rate of Change in Money Supply (M3)

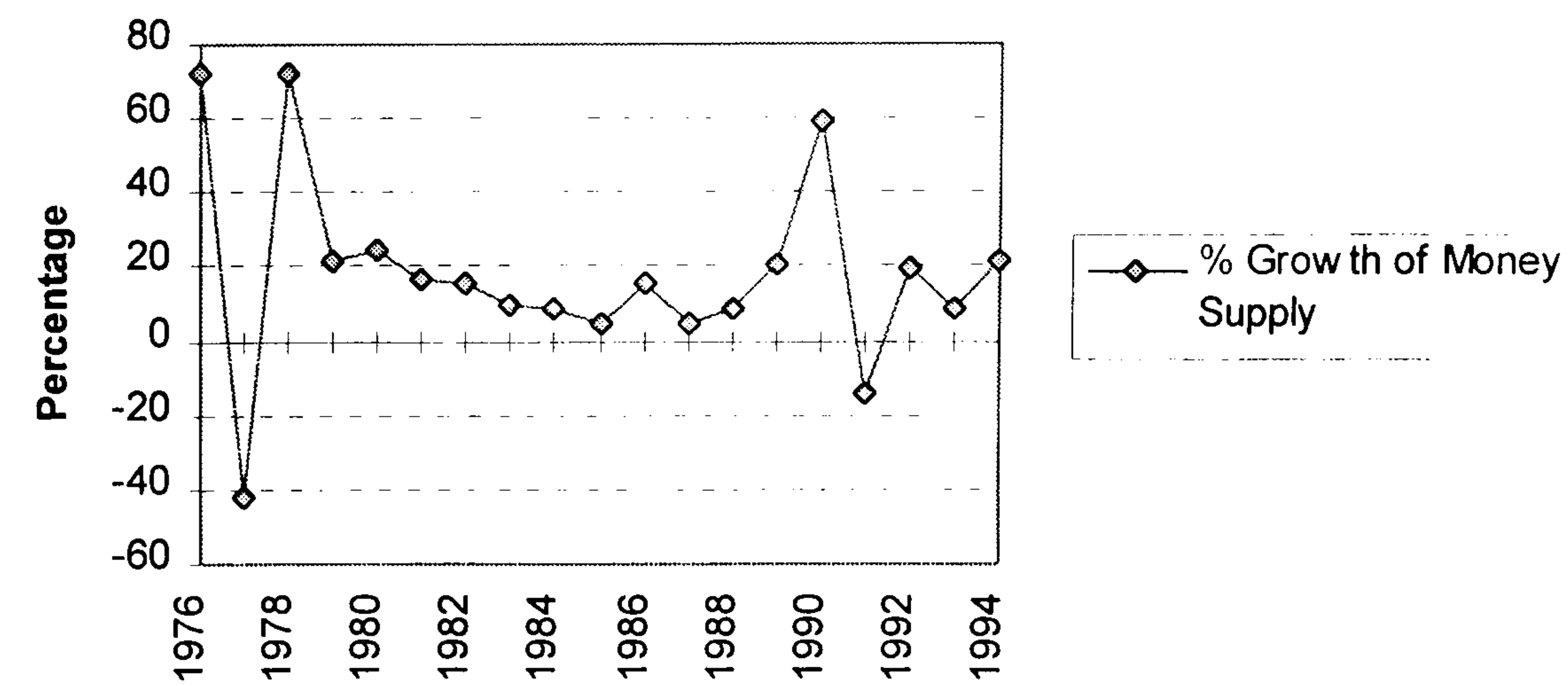


Figure 3.13 Government Revenue and Expenditure

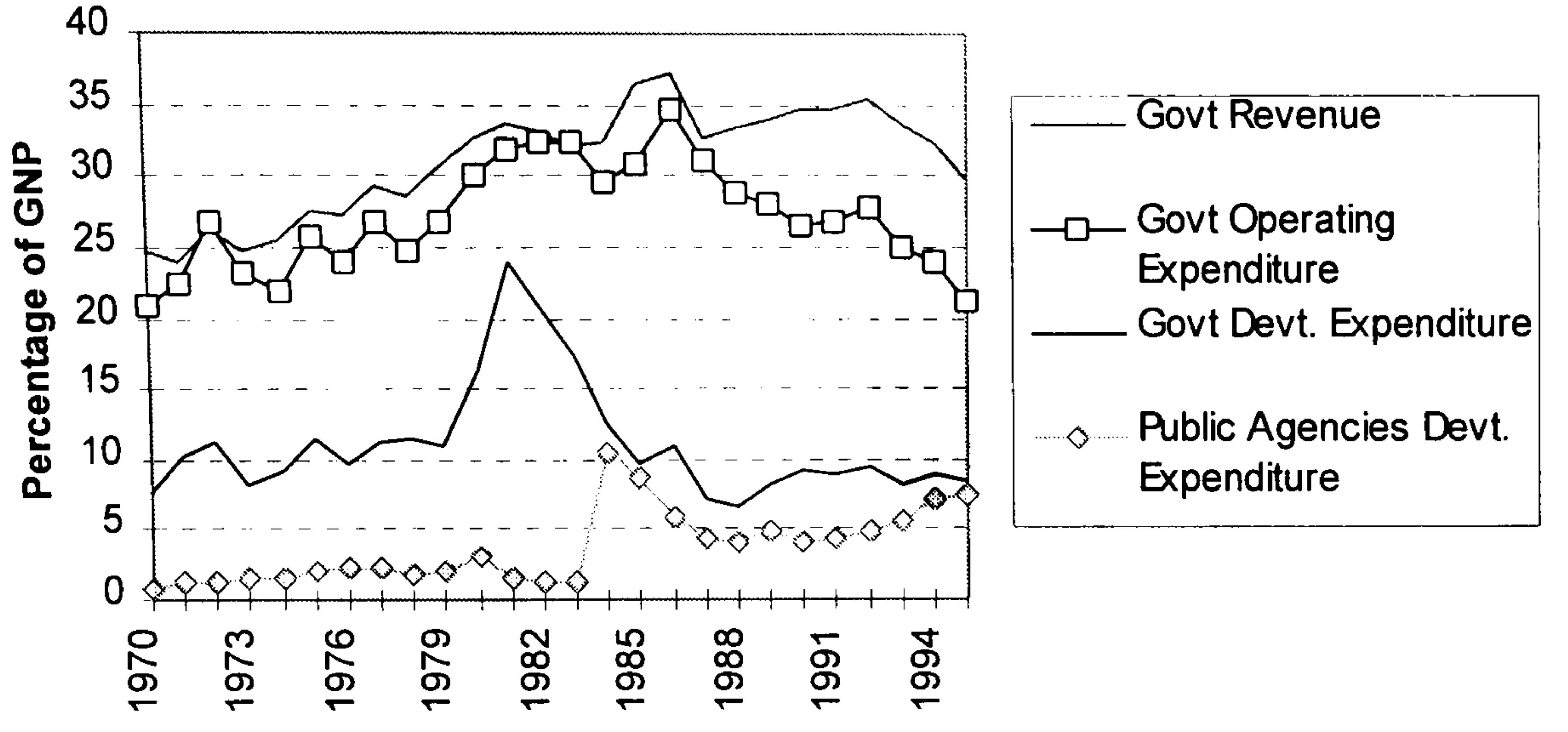


Figure 3.14 Current and Overall Surplus/Deficit

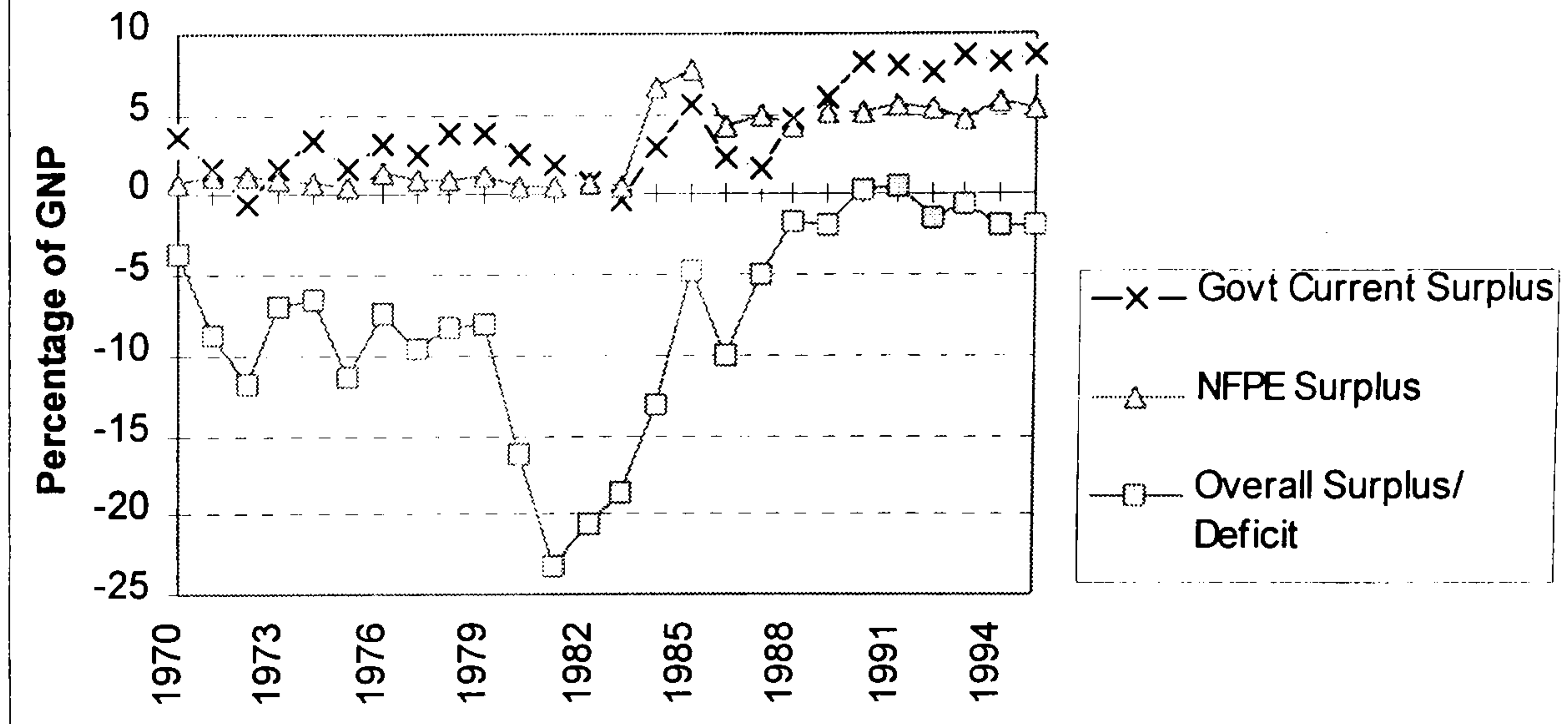


Figure 3.15 Nominal and Real Effective Exchange Rates

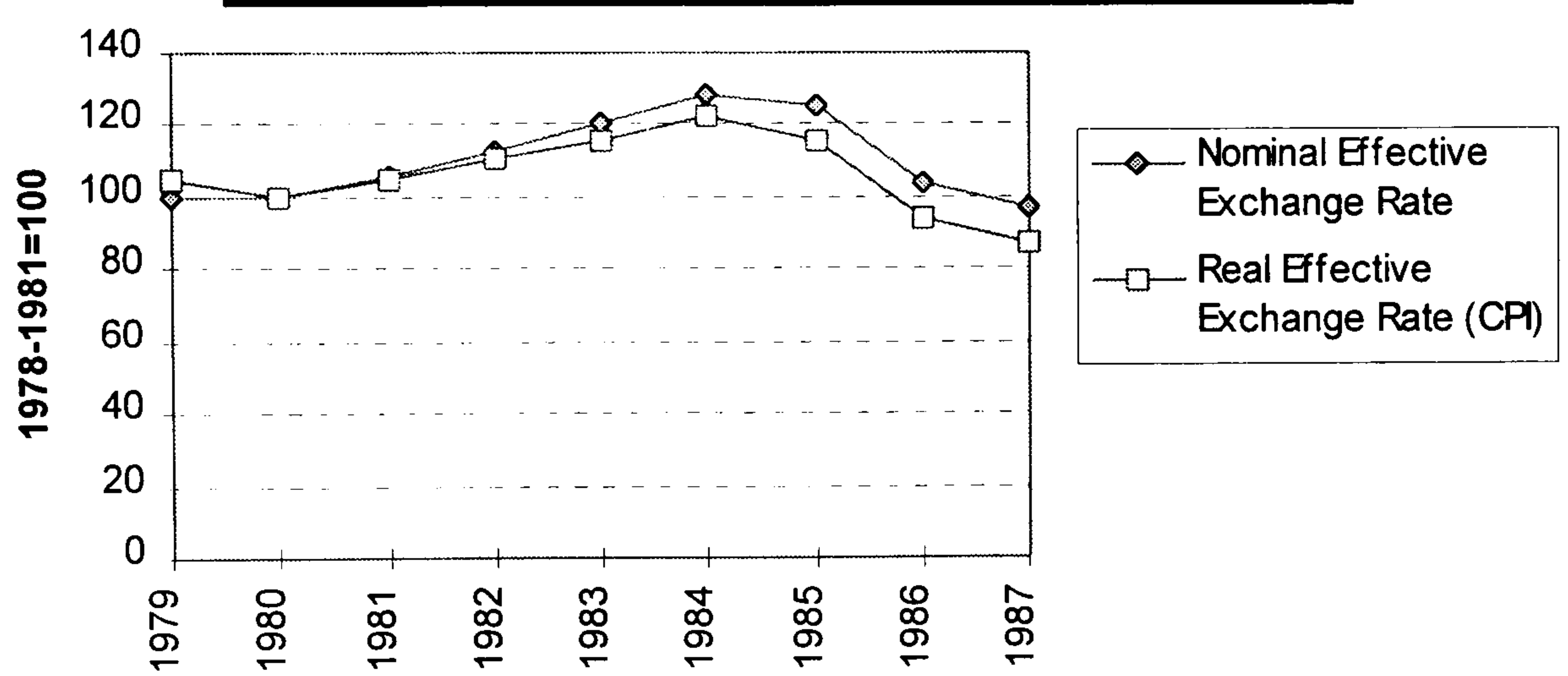
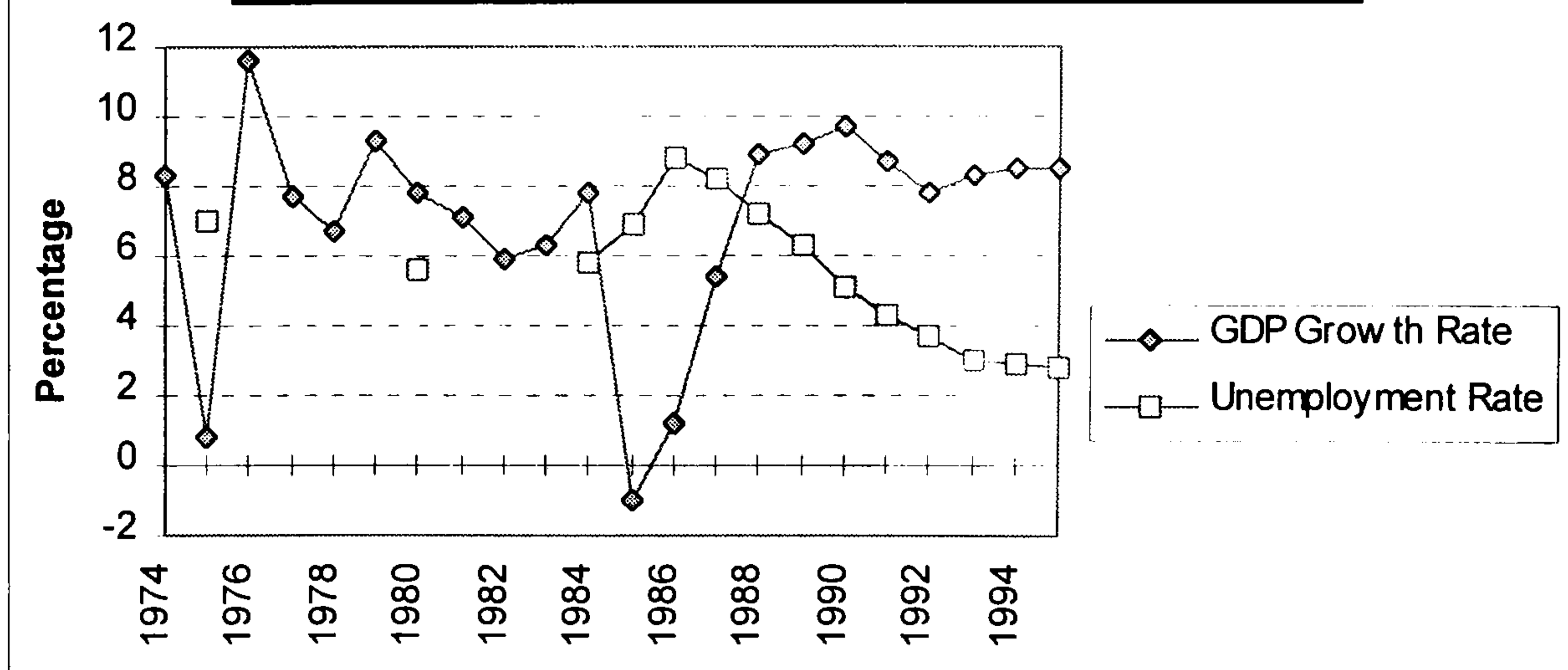


Figure 3.16 GDP Growth Rate and Unemployment Rate



stance adopted in the last few years to contain the inflationary effects from the second wave of oil price hike (Figure 3.12). Coupled with the expansion of aggregate demand, the tight monetary policy had the effect of pushing up interest rates with negative implications on investment and profitability in the tradable sectors. As shown in Figure 3.11 the base lending rate rose by 4.5 percentage points, from around 7.5 percent in 1979 to 12 percent in 1981 and again to 12.5 percent in 1984.

Already the processes of destabilisation were apparent when high growth rates were sustained at the cost of inflation and growing current account deficit in the balance of payments. The rapid expansion of the development expenditure by both the government and non-financial public enterprises (NFPEs) during 1980-82 deepened the overall budgetary deficit in the consolidated public sector financial accounts (Figures 3.13-3.14).

Demery and Demery (1992: 36-39) noted that the three main factors responsible for Malaysia's external imbalances over the period 1979-84 were the OECD recession and the associated deterioration in the country's terms of trade, an expansionary fiscal policy which caused a debt-induced interest rate shock, and an appreciation in the nominal and real exchange rate. The income loss arising from the decline in the terms of trade was considerable. As a percentage of GDP, the real income loss amounted to 7 percent in 1981 and 3 percent in 1982. However, the external imbalances could have been avoided if this situation was accompanied by significant cuts in real expenditure rather than the 'expenditure smoothing' behaviour on the part of the public and private sectors. While pursuing an expansionary fiscal policy, there was monetary restraint where lending to the public and private sector was curbed as part of the explicit anti-inflationary policy. In Gan's study (1988) of exchange rates during the period of destabilisation, he found that the inflow of external capital to finance the budget deficit causes the appreciation of the nominal and real effective exchange rates (Table 3.1 and Figure 3.15). This seriously eroded Malaysia's competitiveness in the world market, dampened its exports of major commodities, and soon brought the country to a deep recession.

TABLE 3.1 MALAYSIA'S FISCAL DEFICIT, TERMS OF TRADE, EXCHANGE RATES AND INTEREST RATES, 1979-87

Year	*Overall Public Sector Deficit*[1]	*Public Sector Development Expenditure*[1]	*Terms of Trade Index*	*Nominal Effective Exchange Rate*[2]	*Real Effective Exchange Rate*[3]	*Base Lending Rate*
1979	7.5	14.3*	122.6	99.6	104.7	7.25-7.50
1980	13.6	18.8	119.8	100.1	100.1	8.5-9.5
1981	19.7	26.4	101.9	105.3	104.8	12.00
1982	18.0	25.9	95.5	112.9	110.4	8.50
1983	15.9	24.5	95.3	120.0	115.8	10.75
1984	12.3	21.3	102.9	127.8	122.1	12.25
1985	7.2	17.5	94.3	125.1	115.2	10.75
1986	13.1	17.1	79.4	103.3	93.8	10.00
1987	9.7	15.4	82.8	97.1	86.8	7.50

Sources: Ministry of Finance *Economic Reports*, various years; Gan (1988)
[1] As percentage of GDP.
[2] Nominal effective exchange rates using reported trading partner weights.
[3] Real effective exchange rates using CPI deflator. An increase in the value of the index indicates an appreciation.
* 1976-80 average.

2.3 Phase III Policy Reorientation and Recession (1985-86)

Even in 1983 it became clear to the Malaysian government that the public expenditure pattern was not sustainable and major adjustment policies had to be quickly adopted to reverse the alarming trend in the balance of payments current account deficit and growing public indebtedness. Serious concerns were expressed in the Mid-Term Review of the Fourth Malaysia Plan and the government took the bold step in cutting its operating and development expenditures in order to bring public sector expenditure in line with revenue. Malaysia's foreign debt was growing at an alarming level and had to be controlled, especially after witnessing the financial debacle in the Latin American and African countries as a consequence of unbridled borrowing. As will be discussed later in the next section, the government resorted to heavy foreign borrowing to fund the expansionary fiscal programmes in the early eighties. There does not appear to be many policy options available to the government given the fact that it wanted to keep a tight rein on money supply to control inflation. In addition, it did not increase taxes or wish to crowd the private sector out from the domestic loans market by increasing further the already high domestic borrowing.

A reversal in the development approach was clearly needed to reduce the high fiscal deficit and related external borrowing requirement. The previous policy of fiscal expansion and monetary restraint gave way to a policy of fiscal restraint and monetary expansion. In addition, the real exchange rate was allowed to depreciate to restore the competitiveness and profitability of the tradable sector. Wide ranging measures were adopted in the Mid-Term Review of the Fourth Malaysia Plan to re-orientate public policies and set the stage for a reduced role of government in development after the mid-eighties. This proved to be the next milestone in Malaysia's development thrust after the adoption of NEP in 1971. These policies were adopted in 1984 and continued to be implemented even during the recession period in 1985-86. The budget restraint was applied without resorting to counter-cyclical policies that could stimulate the economy from the demand side. While limiting the expansion of the public sector, the government sought to revitalise the economy from the supply side by removing what were perceived as the factors constraining economic growth.

From the national accounts identity, Demery and Demery (1991: 53) examined the overall pattern of expenditure changes which brought about the initial destabilisation and the subsequent adjustment in Malaysia. The decomposition of the observed changes in the trade balance into the various expenditure components are shown in Table 3.2. During the phase of rapid fiscal expansion in 1979-82, public consumption and particularly public investment contributed the main bulk of the expansion in absorption and accounted for 98 percent of the change in the trade balance as a ratio of GDP. The situation was different during 1982-87 when the trade deficit was narrowing. During this period, the burden of expenditure change was more evenly spread, with private consumption being most important component. As noted by Demery and Demery, reductions in expenditure during the adjustment phase were principally borne by the private sector (66 percent), in direct contrast to the expansionary and destabilisation phase.

TABLE 3.2 DECOMPOSITION OF ANNUAL CHANGES IN MALAYSIA'S TRADE BALANCE, 1979-87

Year	*(X–M)/Y*	C_p/Y	C_g/Y	I_p/Y	I_g/Y
1979-80	-0.079	0.025	0.025	0.003	0.026
1980-81	-0.030	-0.010	0.010	0.008	0.038
1981-82	-0.018	-0.014	0.005	0.005	0.022
1982-83	0.013	-0.015	-0.003	-0.002	0.007
1983-84	0.036	-0.006	-0.022	0.013	-0.021
1984-85	0.060	0.008	0.000	-0.072	0.004
1985-86	0.111	-0.057	0.000	-0.038	-0.016
1986-87	0.028	-0.015	-0.003	0.022	-0.032
Percentage share					
1979-82	100.00	1.84	31.27	0.03	66.86
1982-87	100.00	34.43	11.15	31.13	23.29

Source: Demery and Demery (1991)
From the national income identity: $(X - M)/Y = 1 - C_p/Y - C_g/Y - I_p/Y - I_g/Y$, where $X - M$ is the trade surplus, Y is gross domestic product, C is consumption, I is investment, and p and g are subscripts for private and public sectors.

The increased government interventions in the market to overcome the problem of market failure, especially pertaining to distribution, had already produced some trends that merited concern. According to Kasper (1974), the Malaysian economy in the 1960s and early 1970s could be characterised as a very open, very adaptable economy with a relatively small government that kept out of production, with a large primary sector and a potential for fast industrial growth. When he re-examined in the Malaysian economy in early 1987, he argued that the Malaysian economy had become less competitive as suggested by its low third factor share of growth. [4] In decomposing the growth in the Malaysian economy from 1969 to 1986, Kasper (1987) found that the contribution of third-factor share was estimated around 12 percent and 23 percent, implying that growth arose largely from a combination of labour and capital inputs. He noted that studies of post-war Europe and Japan showed that the third factor accounted between 40-60 percent of total growth in these economies during their phase of rapid growth. In addition, estimations of third factor in the dynamic Newly Industrialising Economies are 45 percent for South Korea (1955-73), 60 percent for Taiwan (1955-60) and 47 percent for

[4] This analysis follows Denison's approach which decomposes the output growth rate according to the Cobb-Douglas-type aggregate production function. After taking the first order condition and estimating the coefficients for labour and capital, it is then possible to calculate the contribution of "third factor inputs", such as technology, knowledge, institutions, scale economies, etc., to economic growth (see Denison, 1967; 1985).

Hong Kong (1960-70) (Chenery, 1986:21-22). The low third factor estimate for Malaysia implied low growth of labour and capital productivity and high incremental capital-output ratio (ICOR), raising questions about the quality of technology and innovation, entrepreneurship, as well as policy and institutional framework. He argued that when governments intervene in markets, entrepreneurial energies are directed away from genuine economic enterprise towards rentier profiteering that could cause the markets to lose structural flexibility. Kasper's study, which was undertaken just after the period of macro destabilisation and adjustment, painted a rather dismal picture of the Malaysian political economy. His estimate of the third factor share in Malaysia's economic growth is biased downwards because it included the cost of large investment projects made in the early eighties but not their forthcoming benefits in contributing to economic growth after the gestation period. Investment projects, such as the Heavy Industries Corporation of Malaysia (HICOM), the liquefaction plant in Bintulu, purchase of LNG tankers, and expansion of port facilities in Labuan, initiated in the early eighties had long gestation periods and the benefits of which would only arise after the period of his study. While one can dispute over the quantitative aspects of his estimates, the general tenor of his arguments on the dangers of too much government intervention in the economy would still be relevant.

To redress the structural problems, the government introduced economic liberalisation and deregulation which improved the investment policies and incentives to promote private sector participation. This appeared to be an important change from the previous policy stance of increased public sector intervention which led to 'big government'. Real public sector consumption and investments generally grew faster than that for the private sector throughout the seventies to the early eighties. The exception was during 1978-79 when private sector consumption and investment were buoyant with the high prices of primary produce, the windfall earnings from petroleum and gas, and a robust expansion of money supply. The *Mid-Term Review of the Fourth Malaysia Plan* (Malaysia, 1984) and the *Fifth Malaysia Plan* (Malaysia, 1986) expressed the Malaysian government's intention to make every effort in ensuring that growth was private sector led, while the role of the public sector was to facilitate and promote a conducive environment for economic growth and efficiency. Instead of competing with the private sector, the public sector was to complement private sector efforts. To quote the *Fifth Malaysia Plan* (Malaysia, 1986: 4), 'The public sector will no longer play an expansionary role in spearheading economic growth. It will, however, continue to provide leadership through its efforts in creating a more suitable environment and climate in which the private sector can play an enhanced role of generating growth . . .'

Among some of the policy measures to redress the structural economic problems include:

1) Greater emphasis on management and financial prudence in the public sector to reduce wastage and improve efficiency;

2) Privatisation programme of public enterprises such as Telekom, Malaysian Shipping Corporation and the Kelang Container Terminal, and the programme of Build-Operate-Transfer for highways and water supply; and

3) Relaxation of several NEP guidelines and legislative measures, such as the Industrial Coordination Act of 1975 and the Companies Amendments Bill, 1984, which were earlier adopted to facilitate the restructuring process but were later regarded as constraining private sector investment.

Some other important policy measures adopted to release the supply side potential of the economy were:

1) Industrial Master Plan (IMP) in 1985 which provided the strategies for the rapid expansion of industries;

2) National Agricultural Policy (NAP) in 1984 aimed at income maximisation and increasing greater productivity, efficiency and competitiveness in the sector;

3) 'Look East' policy, for Malaysians to emulate the work ethics, attitudes and management practices of successful Far East nations; and

4) 'Malaysia Incorporated' concept to forge a working partnership between the public and private sector in promoting a dynamic and prosperous business environment.

The restraint placed on public expenditure helped to narrow Federal government deficit to 7.4 percent of nominal GDP in 1985 from a high 19.1 percent in 1981. In addition, the overall expenditures of the NFPEs were brought below their revenue. Monetary supply was increased and interest rates were reduced to provide liquidity for private investment. Despite these policies, the Malaysian economy sank into a recession in 1985 and 1986. A negative GDP growth rate recorded in 1985, and a growth rate barely above 1 percent the year after. The recession was precipitated by the simultaneous collapse in the prices of Malaysia's major exports of petroleum, palm oil, rubber, saw logs, tin and cocoa. Since half of Malaysia's manufactured exports were concentrated in electronics and electrical machinery subsector, the depressed global demand for semiconductors in 1985-86 hit the sector badly. As a result of the poor economic performance, the unemployment rate, which was 5-6 percent during the seventies and the first half of the eighties, shot up to 8.3 percent in 1986.

Internally, Malaysia's adjustment programme coincided with the collapse of the property market and the slump in the business cycle. The fiscal austerity brought a decline in civil work projects. Property development which picked up in the late seventies, facilitated by easy credit and boosted by speculative demand, came to a halt when global commodity prices fell. Since property was used for mortgage to secure business loans, the collapse of the property market sent shock waves and accelerated the pace of business failures throughout the country. As a result, the real value-added of the construction industry in 1986 fell by 20 percent of the 1984 construction output. In 1986, the real effective exchange rate of the Malaysian ringgit depreciated rapidly by 7 percent against the US dollar that itself was depreciating against the other major currencies (World Bank, 1989: 19). With the depreciation of the exchange rate, real private consumption and real private investment in 1986 declined by 9.5 percent and 23.4 percent, respectively, over the 1984 level.

2.4 Phase IV Recovery and Rapid Growth (1987-1995)

After the bottoming out of the recession in 1986, the economy made a spectacular recovery. It grew at 5.4 percent in 1987, followed by rapid growth rates above 9 percent during 1988 to 1990, the highest rates recorded since independence. From 1990-95, the economy was growing around 8 percent per year. Per capita income, which declined during the recession years, grew at an average rate of 10.1 percent in nominal terms from RM4,520 in 1987 to reach RM9,786 in 1995. Real private investment rebounded and grew at 18.5 percent during 1987-95, about 4 percentage points more than public investment. It appeared that the Malaysian government's intention to transform the economy into private sector-led was fulfilled by the end of the eighties. The unemployment rate which peaked in 1986 fell from 8.8 percent to 5.6 percent in 1990 and further to 2.7 percent in 1995 (Figure 3.16). This was achieved despite very little growth in government employment. Since 1984 government employment was kept trim and grew by less than 0.5 percent per annum.

There were several factors accounting for the rapid turnaround. The terms of trade for major non-oil commodities improved in unison and the demand for manufactured products, especially semi-conductors and textiles, surged forward. The entry of India into the palm oil market pushed up demand and prices, while the construction and housing boom in Japan following the yen appreciation increased the demand for log and timber. Recovery was also assisted by the depreciation of the ringgit and the low interest rates. Exports of manufactured goods were particularly strong for 1989 and 1990 that amounted to RM36.5 billion and RM46.8, respectively. Compared to the recession period, the export of manufactured goods for 1989 was three times larger than it was in 1985, while the export for 1990 was about four times larger. The share of manufactured exports to total exports exceeded 50 percent in 1988, recording an increase of 20 percentage points above 1985 (Figure 3.17).

Private investment for 1988-90 grew very rapidly by 27.5 percent per annum in real terms, led by foreign investment responding to the improved business environment and excellent growth prospects. The implementation of the Industrial Master Plan had established a system of creating closer collaboration between the private and public sectors in various dialogues and sectoral task forces. Policies affecting the manufacturing sector were improved, procedures simplified and administrative bottlenecks minimised. The Promotion of Investments Act (PIA), 1986 and the amended Income Tax Act, 1967 gave liberal investment incentives to investors. The exemption order under the Industrial Coordination Act (ICA), 1975 was liberalised to exempt manufacturing companies with

Figure 3.17 Share of Manufacturing to Total Exports

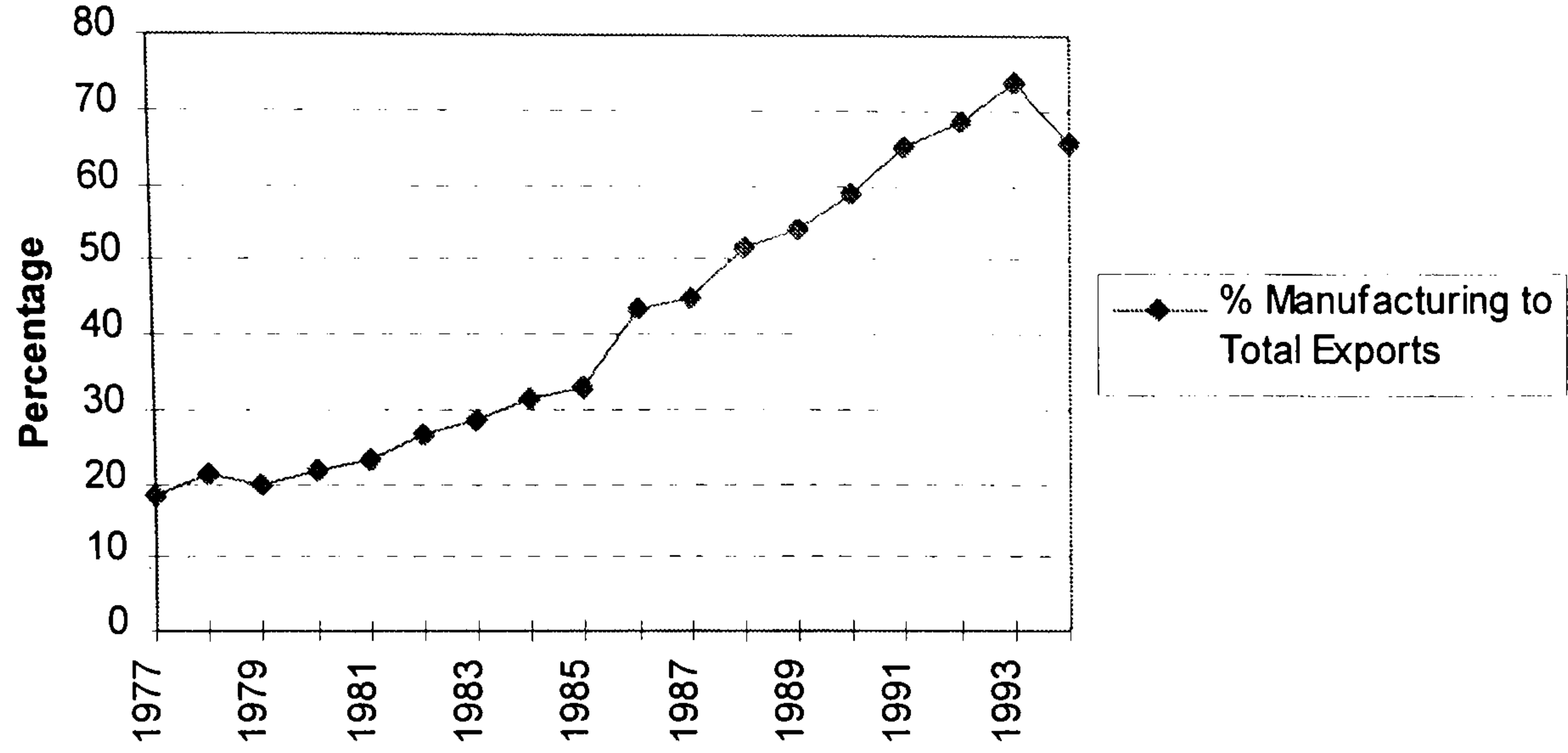


Figure 3.18 Foreign Investment in Approved Projects

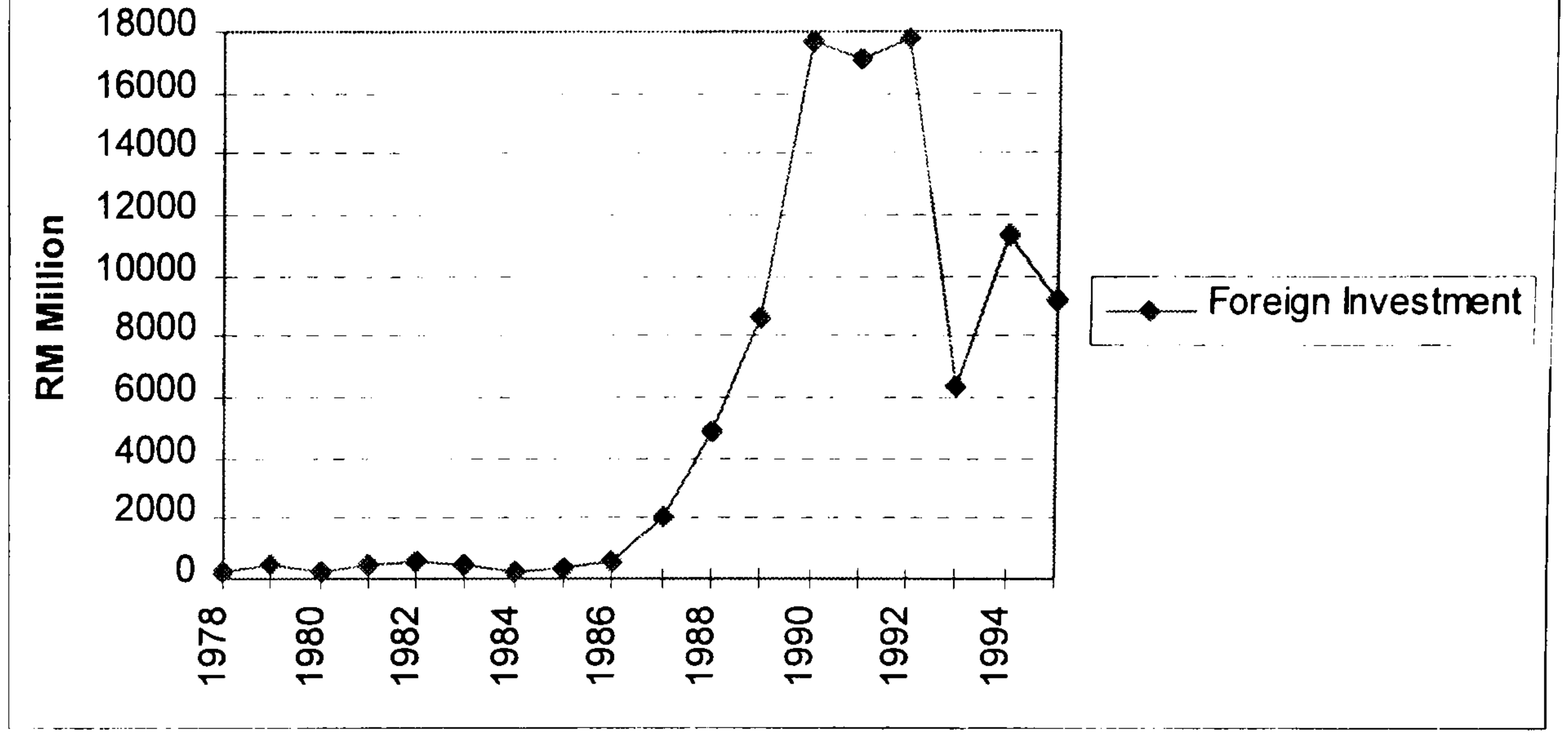


Figure 3.19 Government Operating and Development Expenditures

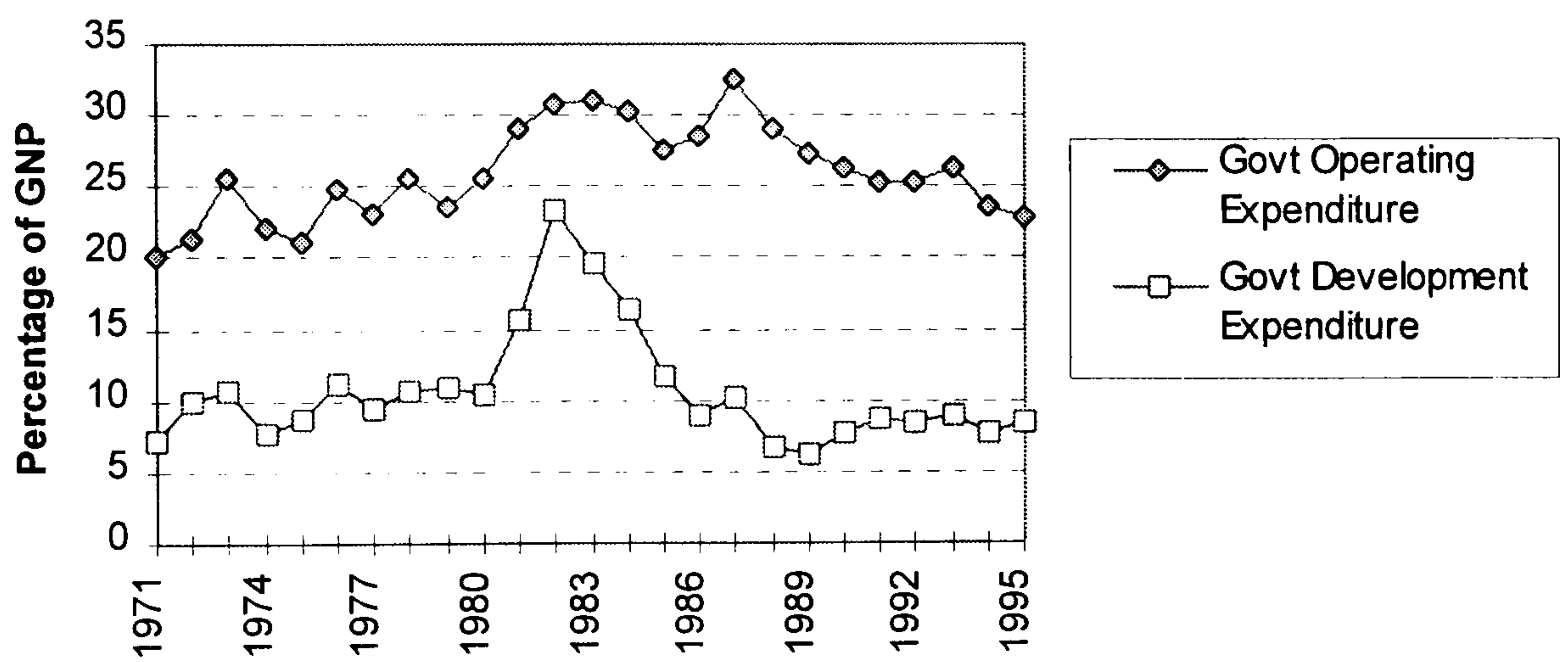
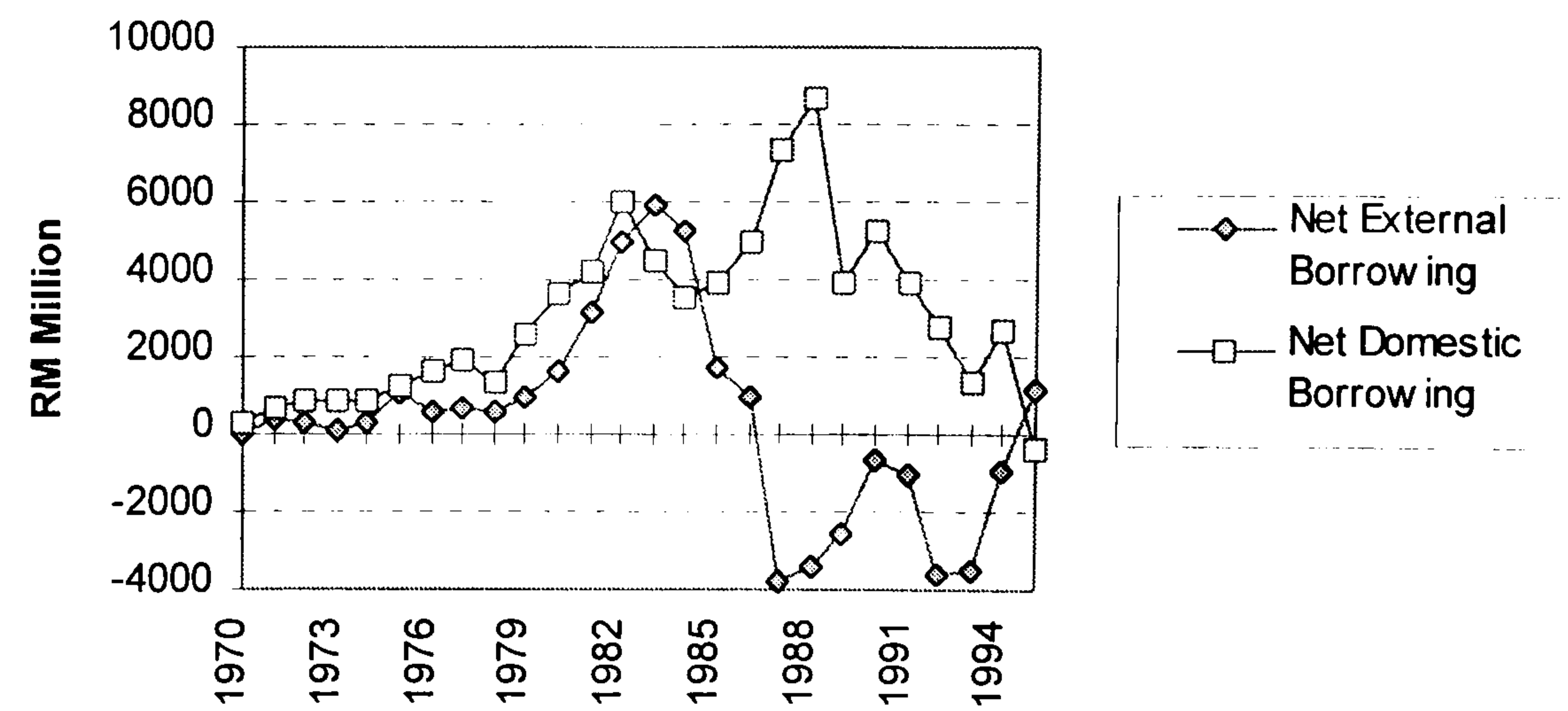


Figure 3.20 Public Sector Sources of Finance



owners equity of less than RM2.5 million or 75 workers from being licensed. The equity guidelines for foreign investment were liberalised. The cost of energy was reduced since March 1989 while the government introduced special rebate schemes for rubber and textiles subsectors and additional incentives for the wood-based industries (Malaysia, 1991: 126-7).

There was a remarkable growth in proposed foreign capital investment from RM1 billion in 1985 to RM18 billion in 1992. As shown in Figure 3.18, growth of foreign investment after 1987 is nothing short of spectacular, especially for 1990-92 when Malaysia enjoyed an exceptionally favourable set of conditions for incoming investments. During the late 1980s, Malaysia benefited from the relocation of industries from Japan, South Korea and Taiwan in response to rising costs of production and currency appreciation in those countries (Malaysia, 1991b: 134). Foreign investment in approved projects from Taiwan, Japan, Singapore, United Kingdom, United States, Indonesia and Hong Kong accounted for 78 per cent of the total proposed investments. Government operating expenditure which started to decline in 1983 rose again in 1987 (as a result of the backlog of expenditure deferred during the recession years) before declining again towards the tail end of the eighties. Government development expenditure as a share of GDP was brought to the levels of early seventies (Figure 3.19).

In the next section that follows, we consider public expenditure and revenue during 1970-95 in greater detail, before proceeding to the third section on the policies for 1990s and their implications for fiscal policies.

3. PUBLIC EXPENDITURE AND REVENUE, 1970-95

3.1 Public Expenditure, 1970-80

Even at the start of the decade, Malaysia had a substantially larger government presence in the economy compared with its Asian neighbours. In 1971 central government expenditure as a share of GNP was 27.7 percent in Malaysia compared with 13-18 percent for Singapore, Thailand, Indonesia and South Korea. The increased public sector role in the financing and implementation of programmes under the Second and Third

TABLE 3.3 CENTRAL GOVERNMENT EXPENDITURE AS A SHARE OF GNP AMONG SELECTED ASIAN COUNTRIES

(In Percentage)

	1971	*1975*	*1980*	*1985*	*1990*	*1994*
Malaysia	27.7	32.6	41.0	37.8	34.5	26.4
Singapore	18.3	18.0	20.8	26.2	21.5	17.6
Thailand	15.9	14.6	19.1	21.8	15.1	18.5
Indonesia	13.0	21.4	24.9	22.3	18.8	17.0
South Korea	16.0	15.9	17.9	18.4	15.6	18.9

Source: IMF, *International Finance Statistics*; World Bank, *World Development*

Malaysia Plans contributed to an even larger total public expenditure. By 1980 the share of central government expenditure to GNP for Malaysia had risen to 41 percent, compared with 25 percent for Indonesia, 21 percent for Singapore, 19 percent for Thailand and 18 percent for Korea (see Table 3.3).

During 1976-80 consolidated public operating expenditure amounted to RM49.7 billion, which was more than double what it was 5 years ago. A large part of the increase going to the expansion of the personnel strength of the security forces, debt-service payments and supplies. In terms of sectoral expenditure, education and health absorbed about one-third of total operating expenditure.

The public sector development programme under the Third Malaysia Plan continued the government's commitment to implement the New Economic Policy (NEP). The plan was an ambitious one. The total allocation of public sector development expenditure for 1976-80 was RM24.9 billion, about two and a half times higher than the amount spent under the Second Malaysia Plan (RM9.8 billion). The Third Malaysia Plan undertook many new projects and consolidated efforts initiated under the earlier plan. The programmes include expanding the opportunities and improving the productivity and income of the poor, increasing the pace of restructuring the Malaysian society, and stimulating rapid development in the less developed regions of the country. The share of the development expenditure to GNP rose from 15.1 percent in 1975 to 19.5 percent in 1980 (Table 3.4).

TABLE 3.4 CONSOLIDATED PUBLIC SECTOR FINANCE, 1970-95

(RM million)

Revenue & Expenditure	*1970*	*1975*	*1980*	*1985*	*1990*	*1995*
General Government Revenue[1]	2,861	5,929	16,371	26,289	38,472	57,265
Operating Expenditure	2,429	5,554	15,063	22,221	29,409	40,627
Current Surplus/Deficit	432	375	1,308	4,068	9.063	16,638
NFPE Surplus	95	96	291	5,649	5,787	10,202
Total Public Sector Current Surplus/Deficit	527	471	1,599	9,717	13,965	26,840
Development Expenditure and Net Lending[2]	959	3,271	9,711	13,125	14,850	30,372
Overall Deficit	-432	-1,998	-8,112	-3,408	263	-3,532
Proportion of GNP (%)						
General Government Revenue	24.6	27.4	32.8	36.5	34.7	29.7
Operating Expenditure	20.9	25.7	30.2	30.8	26.5	21.1
Current Surplus/Deficit	3.7	1.7	2.6	5.6	8.2	8.6
NFPE Surplus	0.8	0.4	0.6	7.8	5.2	5.3
Total Public Sector Current Surplus/Deficit	4.5	2.2	3.2	13.5	13.4	13.9
Development Expenditure and Net Lending	8.3	15.1	19.5	18.2	13.2	15.8
Overall Deficit	-3.7	-9.2	-16.3	-4.7	0.2	-1.8

[1] *Excludes non-financial public enterprises.*

[2] *Includes loans by the Federal government to the states and public authorities*

Source: Ministry of Finance, *Economic Report*, various issues

In 1971 the ratio of total expenditure of the consolidated public finance[5] to GNP was 29.2 percent (Table 3.4). It rose to 40.8 percent in 1975 and 49.7 percent in 1980, with the largest expenditure going to education, defence, infrastructure, agriculture and rural development. In mid-1970s education received close to one-fifth of total public expenditure, while infrastructure accounted for over 12 percent and agriculture and rural development 9 percent. Programmes to improve the physical and social infrastructure were considered important in improving the life of the people, besides creating a conducive environment for economic growth and employment generation. Although there was a current operating surplus during the seventies, the large development expenditure for the Second Malaysia Plan and Third Malaysia Plan programmes resulted in an overall deficit of RM7.6 billion in 1971-75 and RM12.3 billion in 1976-80.

3.2 Public Expenditure, 1981-95

In the early 1980s, public expenditure on economic services, such as agriculture and rural development, commerce and industry, expanded rapidly. Health and education programmes received more resources as well. The government embarked on a major recruitment exercise to fill up existing vacancies under *Operasi Isi Penuh.*[6] This was in response to the general perception that shortage of manpower in the public sector was a major factor accounting for the large shortfalls in the implementation of the Third Malaysia Plan programmes. The expansion of the civil service and the salary revisions pushed up general administration expenditure from RM752 million in 1979 to RM2.1 billion in 1982. Given the increasing size of loans taken by the public sector, the interest payments for debt servicing doubled from RM1.3 billion in 1979 to RM2.7 billion in 1982. Expenditure on transfer and subsidies by the Federal government increased substantially too, from RM2.3 billion in 1979 to RM5.2 billion at the end of 1982.

[5] The sum of operating and development expenditure.

[6] Translated literally as 'Operation Fill Up'. In fact, about 180,000 new jobs in government services were initially planned under the Fourth Malaysia Plan (Malaysia, 1981: 228), but this target was substantially revised during the recession as part of fiscal prudence and consolidation in the public sector.

TABLE 3.5 PUBLIC DEVELOPMENT EXPENDITURE, 1970-95

(RM Million)

Sector	2MP, 1971-75		3MP, 1976-80		4MP, 1981-85		5MP, 1986-90		6MP, 1991-95	
	Expenditure	*%*	*Expenditure*	*%*	*Expenditure*	*%*	*Expenditure*	*%*	*Expenditure**	*%*
1. Economic	*4,956.42*	*66.84*	*13,570.79*	*64.01*	*28,042.13*	*60.54*	*22,886*	*64.83*	*31,236*	*56.79*
Agriculture & Rural Development	1,793.53	24.19	4,672.41	22.04	7,540.90	16.28	7,325	20.75	9,019	16.40
Commerce & Industry	1,433.20	19.33	3,246.21	15.31	6,308.78	13.62	3,981	11.28	5,752	10.46
Transport	1,233.92	16.64	2,842.75	13.41	6,989.69	15.09	6,823	19.33	10,759	19.56
Communication	174.93	2.36	1,152.08	5.43	2,422.54	5.23	792	2.24	73	0.13
Energy	285.86	3.86	1,582.52	7.46	4,571.78	9.87	918	2.60	979	1.78
Others	34.98	0.47	74.82	0.35	208.44	0.45	3,047	8.63	4,654	8.46
2. Social	*1,286.74*	*17.35*	*3,635.99*	*17.15*	*9,972.69*	*21.53*	*8,764*	*24.83*	*13,468*	*24.49*
Education & Training	695.92	9.39	1,548.18	7.30	4,687.59	10.12	5,700	16.15	8,501	15.46
Health & Population	183.25	2.47	307.40	1.45	736.51	1.59	931	2.64	2,253	4.10
Housing	166.01	2.24	1,291.04	6.09	3,934.89	8.50	1,452	4.11	803	1.46
Local Town Council, Welf. Services	21.36	0.29	115.88	0.55	213.08	0.46	291	0.82	798	1.45
Village & Community Devt	29.45	0.40	113.75	0.54	178.23	0.38	237	0.67	441	0.80
Others	190.75	2.57	259.74	1.23	222.39	0.48	153	0.43	672	1.22
3. Security	*1,021.98*	*13.78*	*3,529.80*	*16.65*	*7,494.58*	*16.18*	*2,527*	*7.16*	*8,408*	*15.29*
4. Administration	*149.95*	*2.02*	*465.32*	*2.19*	*810.60*	*1.75*	*1,123*	*3.18*	*1,888*	*3.43*
Total Federal Funds	*7,415.09*	*100.00*	*21,201.90*	*100.00*	*46,320*	*100.00*	*35,300*	*100.00*	*55,000*	*100.00*
State Funds	1,318.61		2,093.42		6,268		8,850		14,000	
Statutory Funds	1,059.11		1,641.83		27,743		17,700		35,000	
Grand Total	*9,792.81*		*24,937.15*		*80,331*		*61,850*		*104,000*	

Source: Malaysia Plans, various issues. 2MP, 3MP, 4MP, 5MP,6MP refer to the Second, Third, Fourth, Fifth and Sixth Malaysia Plans, respectively.
* Allocation

During this period the Federal government increased transfers for pensions and to the state governments, as well as subsidies for agriculture, scholarships, textbook loans programmes, and milk and food programmes. Together, these factors contributed to the rapid increase in the current expenditure of the government that rose from 26 percent of GNP in 1979 to 31 percent in 1982.

Among the four Malaysia plans during 1970-90, the Fourth Malaysia Plan had the largest development expenditure. In terms of Federal Government expenditure, it was more than twice the size of the Third Malaysia Plan and about one-third larger than the Fifth Malaysia Plan (Table 3.5). The scale of fiscal expansion in 1981 and 1982 was unprecedented as the government increased the development budget, as shown in Figure 3.19. Government development expenditure alone for 1981 and 1982 was over 23 percent of GNP, compared to the average of 14.3 percent in 1976-80. The largest category of development expenditure was for defence and internal security. A large part of the expenditure went to infrastructure, in which the allocation for transport, education and irrigation doubled between 1980 and 1982.

Commerce and industry was the other area which received increased allocation of funds in the Fourth Malaysia Plan. Although part of the expenditure was financed from profits generated by the National Petroleum Corporation (PETRONAS) and its subsidiaries, the consolidated public sector deficit increased from 8 percent of GNP in 1979 to 22 percent and 19 percent in 1981 and 1982, respectively (World Bank, 1989: 6). When financial resources turned out to be lower than expectations, it became clear that this expenditure pattern was not sustainable. Expenditure cutbacks and rescheduling of projects were initiated with the launching of the Mid-Term Review of the Fourth Malaysia Plan. The task of reducing the original allocations in midstream could not have been an easy one since most of the projects were in different stages of implementation, with contractual obligations for the government. The larger projects that were started in one plan period would continue into another and require public resources for their successful completion and operation. In addition, the programmes for the eradication of poverty and restructuring of society were not to be affected by the cutbacks. The consolidation of public sector expenditure that ensued set the stage for the approach that was to be applied throughout the decade and into the nineties. This is illustrated by the fact that the public sector development allocation in the Fifth Malaysia Plan was RM10 billion smaller than the Fourth Malaysia Plan allocation.

Recession years: The operating expenditure during the recession years was kept within one-quarter the size of GNP. The debt service charges for 1985-86 had risen quite dramatically. About one-fourth of the total operating expenditure of the Federal government (or over RM5 billion) were allocated to pay interest on outstanding loans and make contributions to the sinking fund. By comparison, the amount allocated for this purpose in 1980 was only 11 percent of total operating expenditure. The rapid appreciation of the Yen by 34.7 percent during 1985-86 increased Malaysia's debt service obligations substantially since loans from Japan constituted 20 percent of Federal government outstanding foreign debt in 1985. The other major expenditure was for social services so that the quality of essential social infrastructure, such as education and health, was maintained even during the recession. About two-thirds of the expenditure for social services went to education and another one-fifth to health services.

In the development expenditure of the Federal government, spending for security registered negative growth of around 38 percent for both 1985 and 1986. Allocation for social services increased by 12 percent in 1986 as a result of increased spending for education and housing. For the economic services, the expenditure for agriculture and rural development, public utilities and commerce and industry in 1986 fell below the 1985 level. This was partly due to planning and implementation problems arising from the reordering of programme priorities as well as from contractors who were unable to complete projects on time. However, the expenditure for transport and communications increased by 32 percent to provide for greater private sector expansion.

The consolidated public sector deficit fell to 7.2 percent of nominal GDP in 1985, but rose again to 13.1 percent a year later. It is generally difficult to cut budget deficits during recession when revenues are low. Revenue derived from direct taxes declined by 6 percent in 1985-86 as the income of companies, individuals and petroleum operations fell as a result of the recession. In 1986 very little revenue was collected from the export of rubber and palm oil which were facing depressed prices.

The narrowing public sector deficit in 1985 was attributed to the increased profits from the NFPEs, especially from the petroleum and gas operations. When the price of crude petroleum fell by 47 percent from US$27.60 per barrel in 1985 to US$14.80 per barrel in 1986, this drastically cut into PETRONAS' profits and reduced expected Federal government revenue since petroleum and gas contributed 22 percent of the total revenue. The NFPE accounts went into deficit again, thereby exacerbating the fiscal deficit.

To stimulate growth without fiscal expansion, the Anti-Recession Committee was formed to draw up short-term programmes to generate growth in employment and output. Growth in money supply (M1) increased from 2.8 percent in 1986 to 13.0 percent in 1987, while nominal interest rate declined. The average rate of discount for three month treasury bills declined from 4.12 percent (1985) to 3.22 percent (1987) and the base lending rates from 10.75 percent (1985) to 7.50 percent (1987). The New Investment Fund (NIF) and a small industries development fund was established to increase the credit supply in the economy.

Expenditure, 1986-95. Operating expenditure during this period was kept within manageable limits and grew at 6.3 percent per year. This comparatively slower growth was in keeping with the fiscal discipline following the 1985-86 recession. The expenditure on emoluments, which accounted for 36 percent of total current expenditure, increased by 5.8 percent per annum due to annual salary increments and salary adjustments for civil servants. In line with financial prudence, spending on supplies and services as well as transfers to government agencies were curtailed selectively.

With economic recovery, public sector development programmes that facilitate growth were reinstated and the total development expenditure for the Fifth Malaysia Plan, 1986-90, was RM35.3 billion. Programmes on agriculture and rural development were aimed at poverty eradication and restructuring of society. Public investment grew by 15 percent per annum during 1988-90, particularly for upgrading and expanding the infrastructure facilities to ease constraints and bottlenecks to growth and cope with the demands of the expanding trade and industry. The government placed emphasis on social and physical infrastructural development to improve the quality of life as well as to provide the country with a broad-based foundation to facilitate investments and growth.

Improvements in the financial position of the public sector enabled additional resources to be allocated for the Sixth Malaysia Plan, 1991-95. Although its total public sector development allocation (RM104 billion) was much higher than that for the Fifth Malaysia Plan (RM61.8 billion), the ratio of development expenditure to GNP was maintained at 14 percent. This reflects the government's on-going efforts at fiscal prudence and more efficient management of public sector programmes and finances, following the directions established since 1983. The bulk of the increase in expenditure was directed towards facilitating economic growth and the provision of infrastructure to facilitate expansion of the private sector. In addition, the social sector was given one quarter of the Federal government development allocations to improve services in education and training, health, and housing. The poverty eradication programmes were directed towards the hard-core poverty groups, while the programmes for restructuring society were devoted to education and training, as well as the development of *Bumiputera* commercial enterprises.

3.3 Public Revenue and Finance, 1970-80

As the range and complexity of government operations increased during the 1970s, the country adopted prudent fiscal and monetary policies to have low price inflation and high credit worthiness. The general government revenue rose from RM2.9 billion in 1970 to RM16.4 billion in 1980. The average growth rate of total revenue was 15.7 percent per year during the first half of the decade and accelerated to 22.5 percent per year in the second half of the decade. For the five-year periods corresponding to the Malaysian development plans, the total government revenue for 1971-75 was RM22.0 billion and it increased to RM54.7 billion in 1976-80 (Malaysia, 1981: Table 6-6). As a share of GNP, this corresponds to 34.1 percent for 1971-75 and 58.6 percent for 1976-80.

The rapid growth of public revenue in the late seventies was fuelled by exceptional set of favourable conditions. Rubber and tin prices reached their peak for the decade with their 1980 prices more than triple the 1970 prices (see Figure 3.5). The rapid growth in export volume for oil palm arising from the expansion in oil palm cultivation in the 1960s and early 1970s as well as the increased production capacity of petroleum from new oil fields off shore coincided with the buoyant commodity prices. The good

TABLE 3.6 SOURCES OF FEDERAL GOVERNMENT REVENUE, 1970-1995

(In Percentage)

	1970	*1975*	*1980*	*1985*	*1990*	*1995*
Direct Taxes	***29.21***	***39.50***	***40.67***	***43.85***	***35.24***	***42.37***
Income Taxes	*27.38*	*37.65*	*37.63*	*41.67*	*32.68*	*37.42*
Companies	20.38	22.79	18.10	18.57	15.23	22.23
Individuals	7.00	8.56	7.06	8.28	8.49	11.00
Petroleum	0.00	6.29	12.47	14.82	8.96	4.19
Other Direct Taxes	*0.00*	*0.00*	*0.00*	*2.18*	*2.56*	*4.96*
Indirect Taxes	***54.13***	***49.92***	***51.21***	***35.24***	***36.73***	***37.14***
Export duties	*10.75*	*12.22*	*18.43*	*8.71*	*6.67*	*2.08*
Rubber	3.33	2.37	7.88	0.01	0.01	0.00
Petroleum	0.00	0.00	4.86	7.76	6.47	1.97
Tin	5.42	3.81	4.13	0.18	0.00	0.00
Palm Oil	0.75	5.51	1.16	0.44	0.01	0.03
Others	0.00	0.00	0.00	0.31	0.19	0.07
Import Duties and Surtax	*23.21*	*15.66*	*14.80*	*11.93*	*11.58*	*12.62*
Excise Duties	*10.38*	*8.80*	*6.99*	*6.52*	*7.68*	*9.61*
Sales Tax	*0.00*	*5.32*	*5.00*	*5.84*	*8.27*	*8.64*
Service tax	*0.00*	*0.00*	*0.00*	*0.51*	*0.41*	*1.59*
Other Indirect Tax	*0.00*	*0.00*	*0.00*	*1.74*	*2.11*	*2.60*
Tax Revenue	***83.34***	***89.43***	***91.88***	***79.09***	***71.96***	***79.51***
Non-tax Revenue	***16.67***	***10.57***	***8.12***	***0.21***	***28.04***	***20.49***
Total Revenue	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Note: Figures may not add up to exactly 100.00 because of rounding up errors.

export performance for the commodities coupled with the booming business conditions contributed to a marked increase in revenue from direct and indirect taxes in the country.

Direct taxes, which contributed 29.2 percent of the total Federal government revenue in 1970, increased to 40.7 percent in 1980 (Table 3.6). Following the growth of income and improvement in the tax collection machinery, revenue from this source was growing at 23.2 percent per year during the seventies. Income tax on petroleum production began to increase in importance in the second half of the decade. Taxes on foreign trade and domestic indirect taxes grew at an average rate of 18.5 percent per year as a result of increased volume of foreign trade, increased prices of both export and import commodities, as well as accelerated growth of domestic production. To expand the tax base, sales tax was introduced in 1972 and service tax in 1975. The sales tax is an *ad valorem* single stage tax imposed at the import and the manufacturing levels. Exemptions were given to smaller manufacturers, certain food stuffs, building materials and books, as well as to exports. The service tax was imposed on large hotels and restaurants.

In view of the large development expenditure of the Second and Third Malaysia Plans, the overall deficit grew from RM7.6 billion in 1971-75 to RM12.3 billion in 1976-80. The larger deficit in the Third Malaysia Plan called for higher level of borrowing without creating inflationary pressure on the economy. Domestic borrowing provided between half to two-thirds of the fund requirements during the decade (see Table 3.7). The bulk of this source was derived from the non-bank private sector, such as the national social security organisation, National Savings Bank and insurance companies. As a result of higher revenue base, the amount of domestic borrowing during 1976-80 was much lower than the amount targeted in the Third Malaysia Plan, that is, RM7.8 billion of actual borrowing as against the target of RM11 billion. At this level of resource mobilisation, the monetary expansion was consistent with the growth in nominal GNP. The public sector programmes under the Third Malaysia Plan was undertaken within an environment of financial and price stability as is evident from the consumer price index

TABLE 3.7 SOURCES OF FINANCING

(M$ million)

Public Sector

Sources of Financing	*1970*	*1975*	*1980*	*1982*	*1985*	*1990*	*1995*
Net Foreign Borrowing [1]	3	1,012	1,590	4,948	1,667	-712	1,172
Net Domestic Borrowing	308	1,209	3,650	6,046	3,872	5,375	-383
Change in Assets	121	238	2,872	1,134	-2,131	-3,788	2,743

Federal Government

Sources of Financing	*1970*	*1975*	*1980*	*1982*	*1985*	*1990*	*1995*
Net Foreign Borrowing [1]	-	912	302	4,773	3,591	3,793	1,751
Net Domestic Borrowing	306	1,209	2,311	5,909	956	-815	-2.073
Interest Payments	262	642	1,444	2,614	5,032	6,816	7,125

[1] *Project loans and market loans*
Source: Ministry of Finance, *Economic Report*, various issues

(CPI). The CPI rose at an average of 4 percent per year during 1976-79 compared with 7.3 percent per year during 1971-75.[7]

3.4 Public Revenue and Finance, 1981-95

For most of the 1970s, growth in public revenue kept pace with public expenditure. This position was reversed during and after 1980 when the growth of pubic expenditure outstripped revenue growth. Between 1979 and 1982 public expenditure increased by 113 percent in nominal terms compared to revenue growth of 50 percent in nominal terms. Allocations were quickly spent during the 1980s. By 1983, 93 percent of the development allocation for the Fourth Malaysia Plan had already been spent (Malaysia, 1984).

To deal with the growing budget deficit, the government avoided resorting to monetary financing through seigniorage since this would lead to inflation. A tight monetary policy was adopted during this period instead. Hence, while the fiscal policy was expansionary during 1979-83, monetary policy remained tight, with adverse

[7] The rapid increase in the earlier part of the decade was due to the precipitous rise in oil prices and international inflation that led to the sharp increase in input prices. The price increase was particularly high for 1973 and 1974 which were 10.5 per cent and 17.4 per cent, respectively.

implications for interest rates and depressed private investment. Monetary growth in the first half of the 1980s decelerated not only because of the decline in the net foreign reserves but also due to the fall in net lending to the public and private sectors. In fact, the growth rate of M1 (which consists of currency and demand deposits of the private sector) declined in 1983 and 1984, even before the contraction of economic activity in 1985 (Ariff, 1991: 33). The annual rate of growth of money supply and private sector liquidity declined every year during 1980-84, while inflation was relatively low at an average rate of 4.7 percent.

The deficit was financed from both domestic and foreign borrowings. Domestic borrowing by the Federal Government rose in the early eighties and peaked in 1982 at two and the half times the level of the domestic loans made in 1980. The more important source of financing the deficit was borrowing from external sources, rose from RM302 billion in 1980 to RM4.8 billion in 1982. As a result of the large financial resource requirement in the early 1980s, borrowing from foreign sources increased sharply and closely matched the amount borrowed from domestic sources (Figure 3.20). As a result the Federal government outstanding foreign debt as a ratio of GNP rose from 9 percent in 1980 to an unprecedented level of 32 percent in 1985.

During 1980-85, the tax revenue was around 23-25 percent of GNP and registered a growth rate of 5.5 percent per annum. This was a considerable achievement since this period also coincided with tax cuts as well as the fall in export tax receipts. With the decline of commodity prices, the collection from export duties for 1985 was RM1.8 billion or 30 percent lower than the RM2.6 billion collected in 1980. This decline was more than compensated by the revenue from direct and indirect taxes on petroleum which doubled from RM2.4 billion in 1980 to RM4.8 billion in 1985. In 1981 for the first time PETRONAS remitted dividends on its earnings to the government and emerged as a major financier of government deficits through purchases of the government debt (World Bank, 1983: 49).

Budget deficit. The consolidated public sector budget deficit[8] to GDP increased markedly from 7.5 percent in 1979 to a peak of 19.7 percent in 1981. Deficits of this

[8] The consolidated public sector account refers to the combined revenue and expenditure of the Federal government, state government and non-financial public enterprises.

magnitude were unparalleled given that the level reached in the previous decade was no higher than 11 percent of GDP. The widening deficit of the public sector was not only attributed to the counter-cyclical policies, but also the reduction in tax revenue as a result of poor commodity prices and expenditure growth of the expanding public sector.

In 1983, the government adopted measures to consolidate and rationalise the public sector to control the large public sector deficit. The Federal government development expenditure fell from RM11.5 billion in 1982 to RM8.4 billion in 1984, representing a reduction of 14.4 percent per annum. Uncommitted projects were suspended, while projects in their initial stages that did not have high social or economic costs were terminated or rescheduled. The government instituted a wage freeze in the public sector and adopted cost saving measures at all levels of government. These measures brought immediate results since the expenditure on wages and salaries as well as purchases of goods and services came to a standstill in 1983. Transfers and subsidies, the second largest category of expenditures, grew by less than 3 percent in nominal terms, compared with an average of 36 percent two years before. As a result of increasing debt commitments, the interest payment was the only item showing a rapid increase of 40 percent over the 1982 position. The effectiveness of the fiscal rationalisation on the government budgetary position were reinforced by a healthy operating surplus arising from PETRONAS petroleum operations and the sharp reduction in the development budget. Despite the fiscal austerity adopted by the Federal government, the non-financial public enterprises were not affected by these measures. They continued to increase their own investment programmes from domestic and foreign sources of funding. This situation was brought under control in 1984 when they were made accountable to the Treasury with regards to their investment and financing programmes.

Revenue, 1986-95. The general government revenue grew by 8 percent per annum during 1986-90, but as a percentage of GNP it declined from 36.5 percent in 1985 to 29.7 percent in 1995. The decline had been attributed to the deterioration of the overall tax buoyancy which fell from 1.0 during the Fourth Plan period to 0.6 during the Fifth Plan period (Malaysia, 1991b: 67). During the 1980s, there was increased tax exemptions, allowances and incentives given to the private sector to promote investment as well as lower petroleum and commodity prices.

During 1987-95, the period of recovery and rapid economic growth, company income tax and individual income tax grew at 18.2 percent per annum and 14.2 percent, respectively, as profits and personal income increased during the economic upswing. Income tax derived from petroleum companies increased to RM2.6 billion in 1990 but declined thereafter as production and oil price declined in the early nineties. Indirect taxes also recorded a rapid growth of 21.7 percent per annum and accounted for 37 percent of total federal government revenue by 1995. The main sources of revenue were from import duties, surtax, excise duties and sales tax which arose from higher imports, stronger consumer spending, and improvements in the tax administration.

The overall deficit narrowed, brought about by prudent public sector spending, increased revenue accruing from rapid economic recovery, as well as the operating surplus of NFPEs. The overall deficit in the consolidated public sector finance from 4.9 percent of GNP in 1987 to around zero in 1989-90, before rising to 1.8 percent of GNP in 1995. Public sector borrowing to finance the deficit declined rather spectacularly from RM7.0 billion in 1987 to RM789 million in 1995. With the exception of 1995, the source of financing for 1987-94 came from non-inflationary domestic sources.

4. POLICIES FOR THE NINETIES AND BEYOND

4.1 Vision 2020 and National Development Plan

The year 1990 marked the end of the First Outline Perspective Plan (OPP1). During the 20 years of its implementation, Malaysia had come a long way in socio-economic development. Its economy grew at an average rate of 6.7 percent per annum, while its per capita income doubled. Exports of goods and services grew by 9.2 percent per annum accompanied by the expansion of manufactured exports that contributed 60 percent of total exports in 1990.

Much progress had been achieved in addressing the problems of poverty and socio-economic inequality among ethnic groups. Poverty among all ethnic groups was significantly reduced. The proportion of poor households in Peninsular Malaysia declined from 49.3 percent in 1970 to around 15 percent in 1990 (Malaysia, 1991a: 9).

During the same period, the proportion of *Bumiputera* employed in the manufacturing sector increased from 28.9 percent to 49.1 percent, while their employment in agriculture fell from 50.3 percent to 22.2 percent. More *Bumiputera* were also engaged in professional, managerial and technical occupations, while their share ownership[9] grew from RM125.6 million in 1970 to RM22,298 million in 1990, accounting for 20.3 percent of total share ownership. Although *Bumiputera* share ownership fell short of the NEP target of 30 percent, the growth had been remarkable. *Bumiputera* share ownership registered an average annual growth of 30 percent (as against 16 percent for overall growth) during the OPP1 period and was 177 times larger in 1990 than it was twenty years ago.

After the end of the OPP1 period, the direction for the country's development efforts for the next thirty years will be guided by the policy pronouncement of Vision 2020[10]. Under this vision, Malaysia strives to be a united, fully developed nation by the year 2020. The development approach spans several dimensions, encompassing not only economic growth, but also other aspects of development, such as the achievement of national pride and confidence, political maturity, spiritual values, liberal and tolerant society, scientific and technological progress, as well as a caring, economically just, competitive and prosperous society.

The first decade within this thirty years development perspective is addressed by the Second Outline Perspective Plan (OPP2) which sets out policies, strategies and targets for 1991-2000. As in the First Outline Perspective Plan, national unity will remain the over-riding goal of socio-economic development. The basic strategies of NEP are given a new focus: (a) eradicating hard-core poverty; (b) developing an active *Bumiputera* Commercial and Industrial Community; (c) greater involvement of the private sector in restructuring society; and (d) greater emphasis on human resource development. Poverty eradication programmes will target on the hard-core poor and the poverty rate is projected to decline from 17.1 percent in 1990 to 7.2 percent by the year 2000. The restructuring strategy will focus on developing a *Bumiputera* Commercial and

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[9] This include the share holdings of *Bumiputera* individuals and trust agencies.

[10] In the inaugural meeting of the Malaysian Business Council in February 28, 1991, the Prime Minister presented a paper entitled, "Malaysia: The Way Forward", which charted out the vision of Malaysia as a fully developed nation by the year 2020.

Industrial Community to increase the participation of this community in the corporate and non-corporate sectors. The growth target for the next 30 years will require the doubling of GDP every 10 years or achieving a sustained average growth of 7 percent per annum throughout the period. By the year 2000 the share of manufacturing in GDP is projected to increase to 37 percent and manufacturing exports will account for 81 percent of total exports.

4.2 Framework for Future Policies

The government aims at maintaining economic stability and growth by formulating policies that improve efficiency, productivity and macro policy management. It will seek an appropriate balance of fiscal, monetary and trade policies, help revitalise the primary sector, improve physical and social infrastructure, and enhance the business environment. In particular, the Second Outline Perspective Plan enumerates four policy areas that will be given attention (Malaysia, 1991a: 88-93):

(1) *Improvement of economic efficiency.* Policies will be formulated to increase the competitiveness of the industrial sector and promote greater neutrality in the use of labour and capital. Tariff protection will be reduced or removed and the tax and incentive systems will be reformed. The privatisation programme will continue, while public-private sector co-operation and R&D efforts will be intensified. The tax and incentive systems will be reformed such that they will promote reinvestment, strengthen government revenue as well as achieve the distributional objectives in a more efficient manner.

(2) *Policies to support private investment.* Wage increases should correspond to productivity growth. The regulated prices of industrial raw materials will be reduced to lower the cost of production. The public sector will play a supportive role by improving the physical and social infrastructure as well as the administrative procedures to strengthen business confidence. The financial and capital markets will be strengthened to mobilise funds for private investments.

(3) *Human resource development.* Priority will be given to develop a large pool of skilled manpower for modern services and industry. Training programmes will be market oriented and the education and training systems will be monitored more closely so that there is better matching of the demand and supply of skills in the labour market.

(4) *Policies to stabilise public debt, deficits and spending.* Consistent with its policy to develop a private sector-led export-oriented economy, the government will refrain from an expansionary fiscal stance and involvement in commercial activities. To consolidate public sector finances, the government will reduce subsidies, strengthen the revenue base, and increase the effectiveness of tax administration. It will also encourage greater use of user-charges and self-financing in the funding of specific programmes. There will also be less reliance on external market borrowing to reduce the country's exposure to exchange rate fluctuations.

4.3 Implications for Fiscal Policy

There are several fiscal policy implications from the four policy areas of the Second Outline Perspective Plan. First, the objectives and targets of the National Development Policy are to be pursued in the environment of sustained economic growth, where the leading growth sectors will be manufacturing and services-related activities. Accordingly it is reasonable to expect that the government will adopt fiscal policies that would help the manufacturing sector to be efficient, competitive and broad-based. Some of the measures would include reviewing the fiscal and tariff-related policies and removing factor price distortions. In view of the focus of the National Development Policy towards eradicating poverty, the government would be concerned that changes in the fiscal policy should have minimal negative impact on poor households. In addition, taxes that affect the income of poor households are also candidates for review, such as taxation on agriculture. In this regard, most export taxes on primary commodities, such as rubber, tin, and palm oil, have already been reduced or completely removed because of their regressive effect on poor households. There would also be continuing investment to raise the quality of human resource through improvements in health and education. It is possible that further tax incentives would be offered to institutions and employers that contribute to increasing the quality of human resources in the country.

Second, the maintenance of macroeconomic stability is crucial to safeguard the excellent growth record of the country, especially that achieved during the last few years. Any adverse fiscal developments would have to be closely monitored such that public spending would be matched with the revenue base. The restraint on public spending would continue, while public expenditure would be in the areas with the highest payoffs, such as enhancing the country's economic growth potential and productivity, stimulating private sector investment, improving the quality of life of the people, and upgrading human capital. In addition, to keep public expenditure on social services small, there would probably be a more pervasive adoption of user-charges on public services and amenities. On the revenue side, some taxes would have to be reduced. This is to ensure that that these taxes are not too out of line with the tax regimes of neighbouring countries or in fulfilment of Malaysia's obligations with regards to international agreements on free trade. To compensate for the revenue loss, the government would probably be looking for tax handles that can increase revenue with minimal distortions on the economy. This would imply the move to broaden the tax base and increase the tax buoyancy so that tax revenue would keep pace with or grow faster than the rate of economic growth. It could also involve tapping into potential sources of revenue and eliminating unnecessary business tax incentives and subsidies.

Third, the public sector would focus on providing public goods characterised by market failure such as primary education and preventive health, while reducing activities that compete with the private sector. On the other hand, there has been increasing private sector participation in the provision of infrastructure, which in the past was considered the preserve of the public sector. The provision of social services, health and education have traditionally accounted for the largest single category in the budget. The privatisation of non-financial public enterprises during the Fifth Malaysia Plan was found to be effective in raising the efficiency of providing of infrastructure, reducing the burden on public finance, and expanding equity ownership for the *Bumiputera*. With greater involvement of the private sector in providing physical infrastructure, health and educational services, the focus for the government in the future would move from direct provision of services to the monitoring of standards and regulating the delivery of social services by the private sector.

Fourth, an important consideration for the government is to reform the tax system so that it could meet expenditure requirements without distorting incentives to work and invest. The wide range of fiscal incentives that are currently offered to the corporate sector are associated with revenue loss and social and economic costs of inefficient industrialisation. When the effective rates of protection vary across industries and categories of operations, the allocation of investment across sectors tend to be distorted, since business decisions are based on subsidies and exemptions rather competitive market rates of return. The complex system of sales, excise and service taxes cause variations in tax rates as well as exemptions that are inefficient and complicated to administer. Furthermore, the service and sales taxes also caused distortions by tax cascading on the agents based on their position on the production process. It is probably timely for Malaysia to put in place a broad-based, more equitable and neutral system of taxes that would be easier to administer and comply with. It would appear that the value-added tax or its variant can comply with many of these requirements and merit strong consideration by the government for adoption.

5. SUMMARY AND CONCLUSION

This chapter analysed the transformation of Malaysia's economy and the corresponding changes in its fiscal policies during the last 25 years. For analytical clarity, the evolution of the Malaysian economy was examined in terms of four phases: (1) High economic growth and adoption of the New Economic Policy (1970-79); (2) Economic boom with growing macro imbalances (1980-84); (3) Policy reorientation and recession (1985-86); and (4) Recovery and rapid growth (1987-95). The first phase started with the adoption of the New Economic Policy aimed at eradicating poverty and redressing socioeconomic disparities among ethnic groups. This policy, which has a far reaching effect on the Malaysian way of life, ushered in a larger, pro-active government role in development during the seventies and the early eighties. The Malaysian economy grew at an average rate of 7.8 percent per annum, as a result of the successful adoption of the export-oriented growth strategy, favourable prices and productivity growth of primary commodities, prudent economic and financial management, and stable social and political institutions.

During the second phase, Malaysia's terms of trade declined by 20 percent, which was accompanied by the deterioration in the merchandise account and the current account of the balance of payments. The government adopted anti-inflation measures, such as tight monetary policy, and embarked on a counter-cyclical fiscal policy. Following further deterioration in commodity prices, this policy stance worsened the overall budgetary deficit in the public accounts and foreign debt increased to an unprecedented level. At this juncture, the government took the bold step of reducing public expenditure and initiated wide ranging re-orientation of policy measures.

In the third phase, the cut in public expenditure coincided with the price collapse of Malaysia's major exports, such as petroleum, palm oil, rubber, saw logs, tin and cocoa. The economy sank into recession in 1985-86. Along with anti-recession measures, the government adopted further policy measures to redress structural problems. These include reducing the size and role of the public sector, giving greater emphasis on the management and utilisation of public resources, introducing policies for economic liberalisation and deregulation, widening investment incentives to promote private sector participation, and embarking on the privatisation of public enterprises, utilities and infrastructure.

The period after 1987 is the phase of recovery of the Malaysian economy, with rapid growth and low inflation. The terms of trade for major non-oil commodities improved. Assisted by the depreciation of the ringgit and low interest rates, export demand for manufactured goods was strong and private investment grew rapidly. During 1987-95, the economy was growing at an average rate of 8-9 percent per annum in real terms and real private investment expanded at an annual average rate of 18.5 percent, about 4 percentage points higher than public investment. The unemployment rate, which peaked in 1986, declined to 5.6 percent in 1990. The country reached full employment in the early nineties.

The chapter analysed public expenditure and revenue during 1970-95. Even at the start of the seventies, the presence of government in the Malaysian economy was larger than its neighbours. However, with the ambitious development programmes in the seventies, the share of public expenditure to GNP rose from 29 percent in 1970 to 50 percent in 1980. Until the fiscal cutback after 1984, public expenditure on economic services, health, and education expanded rapidly in the early eighties. Besides giving significant allocation of funds to the non-financial public enterprises, the government invested in heavy industries, purchased LNG tankers and foreign-held plantation companies, and expanded port facilities. During 1985-95, operating expenditure was kept within manageable limits, while public development programmes were reinstated following economic recovery. Public investment was directed towards upgrading and expanding the infrastructure facilities, as well as poverty and restructuring programmes. Although the allocation for the Sixth Malaysia Plan (1991-95) was larger than the Fifth Malaysia Plan (1986-90), the ratio of development expenditure to GNP was maintained at 14 percent. The share of public expenditure to GNP was 37 percent in 1995, or 13 percentage points lower than it was in 1980.

For most of the 1970s, growth in public revenue kept pace with public expenditure, which was undertaken within an environment of financial and price stability. However, between 1979 and 1982, public expenditure increased by 113 percent in nominal terms compared to revenue growth of 50 percent in nominal terms. Fiscal policy was expansionary, while the government kept a tight monetary policy, which resulted in high interest rates and depressed private investment. The deficit was financed from domestic and foreign borrowing, both of which increased rapidly. The Federal government outstanding foreign debt as a ratio of GNP rose from 9 percent in 1980 to an unprecedented level of 32 percent in 1985.

In the face of growing deficit and public debt, the government adopted measures in 1983 to rationalise activities of the public sector. Fiscal austerity was extended to the non-financial public enterprises in 1984 to control their high levels of borrowing from domestic and foreign sources. During the 1980s, increased tax exemptions, allowances and incentives were given to the private sector to promote investment. Although government revenue grew by 8 percent per annum during 1986-95, its percentage to GNP declined from 36 percent in 1985 to 30 percent in 1995. During 1987-95, the overall public sector deficit narrowed as a result of the combination of prudent spending by the public sector, increased revenue derived from better economic performance, and the operating surplus from the non-financial public enterprises.

The Second Outline Perspective Plan, which contained the policies, strategies and targets for 1991-2000, was adopted at the start of the nineties. The four policy areas that would be given attention are: (1) improvement of economic efficiency, (2) increased support for private investment, (3) enhanced human resource development, and (4) stabilisation of public debt, deficits and spending. These policy areas have some implications on fiscal policy. First, there would be the need to adopt fiscal policies that promote efficiency, reduce price distortions, and lessen the negative impact on the poor. Second, public expenditure would have to be closely monitored and the government would need to broaden the tax base and increase the tax handles so that revenue can be raised with minimal costs to the economy. Third, with privatisation and greater involvement of the private sector in the provision of physical infrastructure, health and education, the government would need to shift emphasis from providing these services to monitoring standards and regulating the delivery of these services. Finally, there would be a greater need to reform the taxes in order to set in place a broad-based, equitable and neutral tax system that could fulfil the expenditure requirements in a manner consistent with work incentives and private investment.

Malaysia's recent economic experience as well as changing revenue and expenditure patterns help to establish the ground rules for the new directions in fiscal policy. Many of the features of the reformed fiscal policy were in place since 1983 as part of the fiscal austerity and policy adjustment measures adopted by the government. Future public spending would be kept be in line with revenue and the government would limit its activities to areas characterised by market failure. Privatisation of public enterprises and services would continue, implying a larger role for private sector involvement in the provision of services. Changes in the tax system is necessary for the government to raise more revenue without distorting incentives for work and investment. The next two chapters will consider the Malaysian tax structure and the issue of reforming its tax system.

Chapter 4

STRUCTURE AND TREND OF THE TAX SYSTEM

1. INTRODUCTION

After independence in 1957, Malaya (now, Malaysia)[1] inherited the tax system introduced during the British colonial era. Although profit and income tax was collected by the colonial government, the first comprehensive tax system was introduced in 1947. The main objective of the tax system was to achieve more equitable distribution of the tax burden as well as generate revenue for the government.[2] Under the Federal Constitution, the federal government is empowered to raise revenue from a variety of important sources such as income tax, trade taxes and sales taxes. Except for the states with oil fields, the sources of revenue for the other states are less lucrative, being limited to land taxes, mining royalties, entertainment duties, license fees and several minor revenue sources. In 1990, the federal government accounted for 77 percent of the total government revenue (RM38.4 billion) in the consolidated public sector finance, while state governments and local governments accounted for 17 percent and 5 percent of total government revenue, respectively. Over 70 percent of federal government revenues were derived from taxes.

The Malaysian tax system shows a relatively high degree of revenue productivity. For most years, tax collection efforts kept up with growth in the economy and public expenditure. Nevertheless, some of features of the tax system can still benefit from reform to increase efficiency and equity. The tax system has become complex as a result of amendments adopted during successive annual budgets that were aimed at changing

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[1] Malaysia was formed in 1963 comprising a federation of 11 states in Malaya, two states in North Borneo (Sabah and Sarawak) and Singapore. Two years later, Singapore left the federation.

[2] For historical details on the development of the tax system in the peninsula, see Edwards (1970). The post-independence tax structure for 1960-73 is discussed at some length in Salleh (1977).

business and trade conditions. As a result, the tax system has become more difficult to administer and provides opportunities for tax evasion and avoidance.

In keeping with the practice of countries within the Asia Pacific region, Malaysia reduced its income tax and tariff rates in the latter part of the eighties and early nineties. Although the potential tax revenue that could be collected by the government was affected by the rates reduction, it did not lead to public finance difficulties. The rapid economic growth after 1988 generated the required tax revenue, while the policy of public expenditure consolidation adopted during this period reduced the pressure for rapid expansion of tax revenue. The current Malaysian tax system can benefit from a reform that sets in place a broad-based, equitable and neutral tax system, facilitates administration and tax compliance, as well as generates revenue without distorting work and investment incentives.

This chapter examines the Malaysian tax structure since 1970 and how the composition of tax revenue has changed across time. Next, it considers the trend and characteristics of each of the major taxes during the last 25 years, and considers proposals to improve them. The weaknesses and drawbacks of the current sales tax and service tax have been long recognised. One proposal under consideration is to replace them with the value added tax (VAT). A useful indicator of the revenue generating capacity of the tax system is tax buoyancy. In the final section, we estimate the buoyancy coefficients of some taxes and consider some implications of the tax buoyancy estimates in terms of future tax policy directions.

2. OVERVIEW OF THE TAX STRUCTURE

Table 4.1 shows the share of revenue to Gross Domestic Product (GDP) in current prices. The share of revenue to GDP rose steadily from 1970 to a peak of around 25 percent in 1980-81. Revenue growth was particularly rapid during the second half of the seventies, registering an average growth rate of 19.5 percent per annum during 1976-81. This exceptional growth rate was the result of extremely buoyant commodity prices and increased petroleum production from new oil fields off shore. With the economic slowdown, tax revenue collections for 1982-86 was lower, around 21 percent of GDP. There was a distinct break in the pattern in 1987 when the tax revenue share dipped to

TABLE 4.1 TOTAL TAX TO GDP RATIO, 1970-95

(*In RM Million*)

Year	*GDP at Market Price*	*Total Tax Revenue*	*Tax Revenue/GDP (%)*
1970	12,541	2,000	*15.95*
1971	12,955	2,081	*16.06*
1972	14,220	2,394	*16.84*
1973	18,723	3,046	*16.27*
1974	22,858	4,311	*18.86*
1975	22,332	4,576	*20.49*
1976	28,085	5,491	*19.55*
1977	32,340	7,070	*21.86*
1978	36,272	8,007	*22.07*
1979	45,083	9,508	*21.09*
1980	51,838	12,795	*24.68*
1981	56,064	13,419	*23.94*
1982	62,579	12,590	*20.12*
1983	69,941	15,263	*21.82*
1984	79,550	16,474	*20.71*
1985	77,547	16,700	*21.54*
1986	71,729	14,682	*20.47*
1987	79,625	12,473	*15.66*
1988	90,861	14,708	*16.19*
1989	102,587	16,674	*16.25*
1990	115,828	21,244	*18.34*
1991	129,559	25,831	*19.94*
1992	147,784	28,772	*19.47*
1993	163,039	31,900	*19.57*
1994	181,668	34,639	*19.07*
1995	203,428	37,880	*18.62*

***Source*:** Ministry of Finance, *Economic Report*, various years

15 percent of GDP as a result of tax reforms undertaken to stimulate investment and the low taxes collected during the recession years. With the resumption of growth, however, revenue yields rose again to around 19 percent of GDP, but not to the levels achieved during 1976-1986.

The indicators of tax revenue to GDP and government expenditure are shown in Table 4.2. Column A refers to the tax revenue collected by the Federal Government, while Column B refers to the tax revenue without the contribution of petroleum taxes. Petroleum-based taxes were particularly important during 1980-86 when their contribution to government revenue amounted to around 5-6 percent of GDP. Total tax revenue amounted to around 60-80 percent of total expenditure during the seventies. However, the proportion fell below 50 percent of total expenditure on two occasions in the 1980s. The decline in the ratio of revenue to total expenditure during 1980-81 was brought about by the rapid expansion of public expenditure, while the decline during 1986-88 was largely due to reduced tax revenue collection as a result of the recession. Starting from 1990, tax revenue expanded rapidly at an average rate of 12.3 percent per year, which brought an improvement in the proportion of tax revenue to expenditure.

There are two major components of tax revenue, namely, revenue derived from direct taxes and indirect taxes. Revenue from direct taxes are derived from taxes on the income of companies, individuals, petroleum and co-operatives, as well as taxes on share transfer, film rental, estate and stamp duty, property gain duty. The major components of direct taxes are company and personal income taxes and petroleum tax, which grew in importance after 1975. As shown in Table 4.3, revenue from direct taxes amounted to around 10-12 percent during 1980-95, with a slight decline during 1987-90 following the reform in tax and incentive rates. The contribution of direct tax to total tax revenue increased from 35 percent in 1970 to 53 percent in 1995 (see Charts 4.1-4.3).

Before 1982, indirect taxes contributed a larger share to federal government revenue than direct taxes. Trade taxes (comprising export and import duties) were the principal sources of revenue. Export duties on primary commodities, such as rubber, tin, and palm oil, were substantial since Malaysia was the world's leading exporter of these commodities. By contrast, the direct income tax base was small as the country was still in the initial stage of its industrialisation process. However, with rapid economic growth

TABLE 4.2 SELECTED REVENUE INDICATORS OF THE FEDERAL GOVERNMENT

Year	*Tax Revenue as % of GDP*		*Tax Revenue as % of Operating Expenditure*		*Tax Revenue as % of Total Expenditure*		*Total Revenue as % of Total Expenditure*
	A	*B*	*A*	*B*	*A*	*B*	
1970	15.9	15.9	92.5	92.5	69.5	69.5	83.4
1971	16.1	16.0	86.8	86.6	60.0	59.9	69.7
1972	16.8	16.8	78.0	78.0	55.8	55.8	68.0
1973	16.3	16.1	91.2	90.4	68.5	67.9	76.5
1974	18.9	18.2	115.3	111.5	81.6	78.8	90.6
1975	20.5	19.0	93.4	86.8	65.3	60.7	73.0
1976	19.6	18.4	94.2	88.7	67.3	63.3	75.4
1977	21.9	19.5	95.6	85.1	67.1	59.7	73.7
1978	22.1	19.9	99.6	90.0	68.2	61.6	75.3
1979	21.1	19.3	94.7	86.4	67.0	61.2	74.0
1980	24.7	20.0	94.0	76.2	61.1	49.6	66.5
1981	23.9	18.2	85.5	65.0	50.0	38.0	58.9
1982	20.1	14.6	75.5	54.9	45.2	32.9	59.9
1983	21.8	16.9	83.1	64.2	54.9	42.4	67.0
1984	20.7	15.4	75.2	56.0	54.9	40.9	69.4
1985	21.5	15.4	75.2	53.7	57.6	41.2	72.9
1986	20.5	14.7	63.1	45.3	48.6	34.9	64.6
1987	15.7	12.3	53.6	42.0	45.5	35.7	66.2
1988	16.2	12.5	57.8	44.6	49.9	38.5	74.5
1989	16.3	13.1	72.6	58.3	58.1	46.7	88.1
1990	18.3	14.4	84.9	66.7	64.5	50.6	89.6
1991	19.9	15.3	91.3	70.0	70.4	54.0	92.8
1992	19.5	16.0	89.7	73.9	71.1	58.6	96.9
1993	19.6	16.9	99.0	85.7	77.2	66.8	100.9
1994	19.1	17.3	102.6	93.1	76.9	69.8	101.4
1995	18.6	17.2	110.1	101.6	80.4	74.2	101.2

Notes: 1. Column A is total tax revenue collected by the Federal Government.
2. Column B is total tax revenue less petroleum income tax and export duties on petroleum.
3. Total Expenditure = Operating Expenditure + Development Expenditure. The expenditure figures refer to the expenditure of the Federal Government.

Source: Calculated from Ministry of Finance, *Economic Report*, various years.

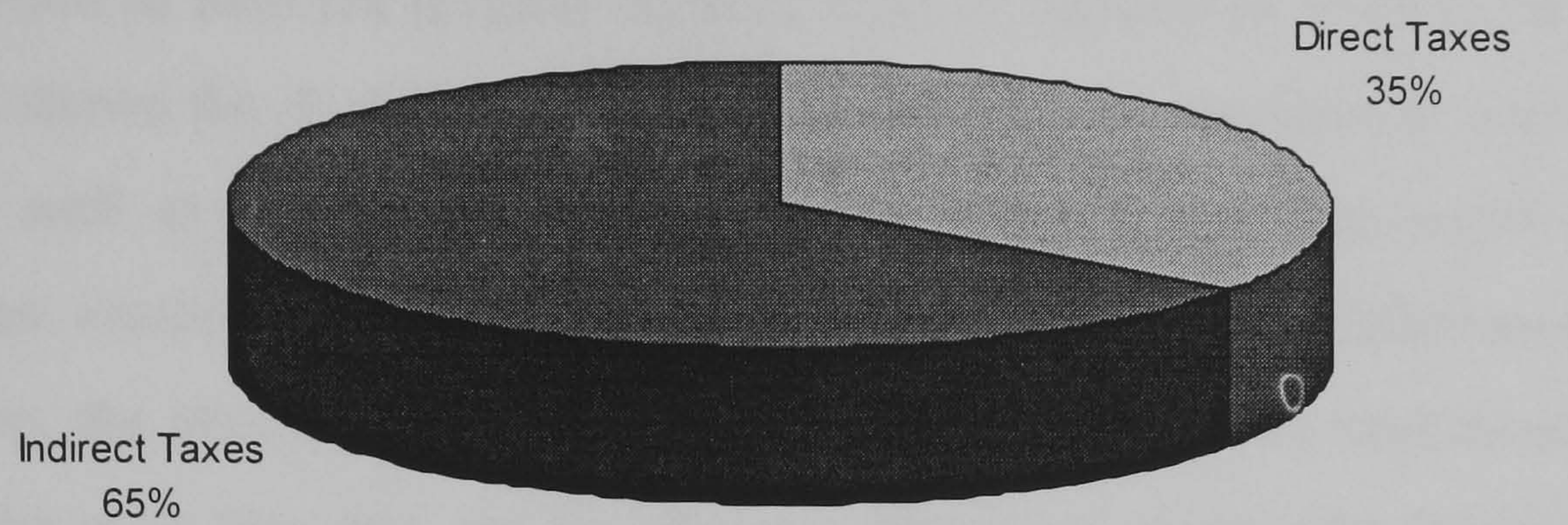
TABLE 4.3 DIRECT AND INDIRECT TAXES TO GDP, 1970-95

(*In RM Million*)

Year	*Direct Tax Revenue*	*Direct Tax/GDP (%)*	*Indirect Tax Revenue*	*Indirect Tax/GDP (%)*
1970	701	*5.59*	1,299	*10.36*
1971	713	*5.50*	1,368	*10.56*
1972	801	*5.63*	1,593	*11.20*
1973	890	*4.75*	2,156	*11.52*
1974	1,384	*6.05*	2,927	*12.81*
1975	2,021	*9.05*	2,555	*11.44*
1976	2,167	*7.72*	3,324	*11.84*
1977	2,946	*9.11*	4,124	*12.75*
1978	3,323	*9.16*	4,684	*12.91*
1979	3,888	*8.62*	5,620	*12.47*
1980	5,664	*10.93*	7,131	*13.76*
1981	6,328	*11.29*	7,091	*12.65*
1982	6,405	*10.24*	6,185	*9.88*
1983	7,712	*11.03*	7,551	*10.80*
1984	8,445	*10.62*	8,029	*10.09*
1985	9,259	*11.94*	7,441	*9.60*
1986	8,653	*12.06*	6,029	*8.41*
1987	6,467	*8.12*	6,006	*7.54*
1988	7,509	*8.26*	7,199	*7.92*
1989	7,793	*7.60*	8,881	*8.66*
1990	10,402	*8.98*	10,842	*9.36*
1991	13,251	*10.23*	12,580	*9.71*
1992	15,403	*10.42*	13,369	*9.05*
1993	17,070	*10.47*	14,830	*9.10*
1994	18,533	*10.20*	16,106	*8.87*
1995	20,186	*9.92*	17,694	*8.70*

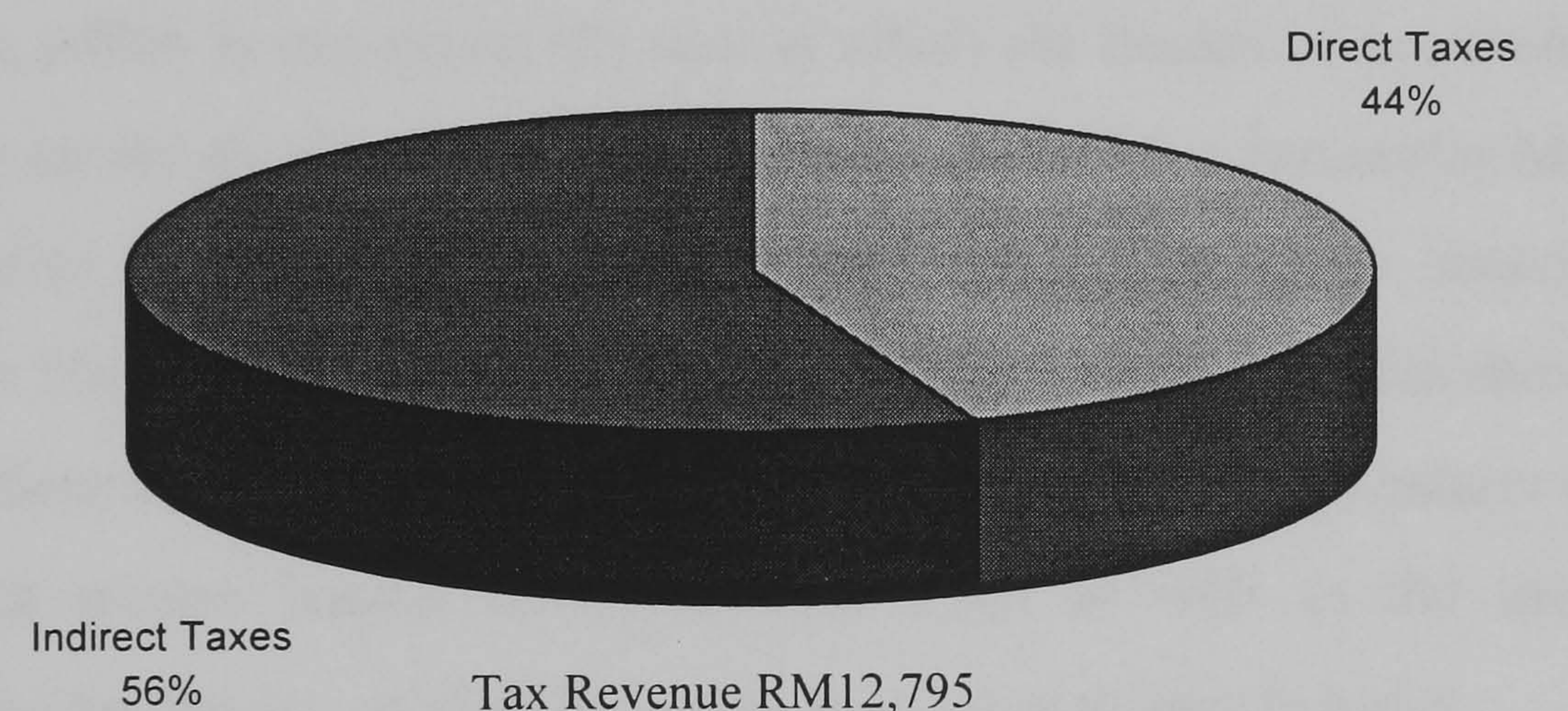
Source: Calculated from Ministry of Finance, *Economic Report*, various years

Figure 4.1 Composition of Tax Revenue, 1970



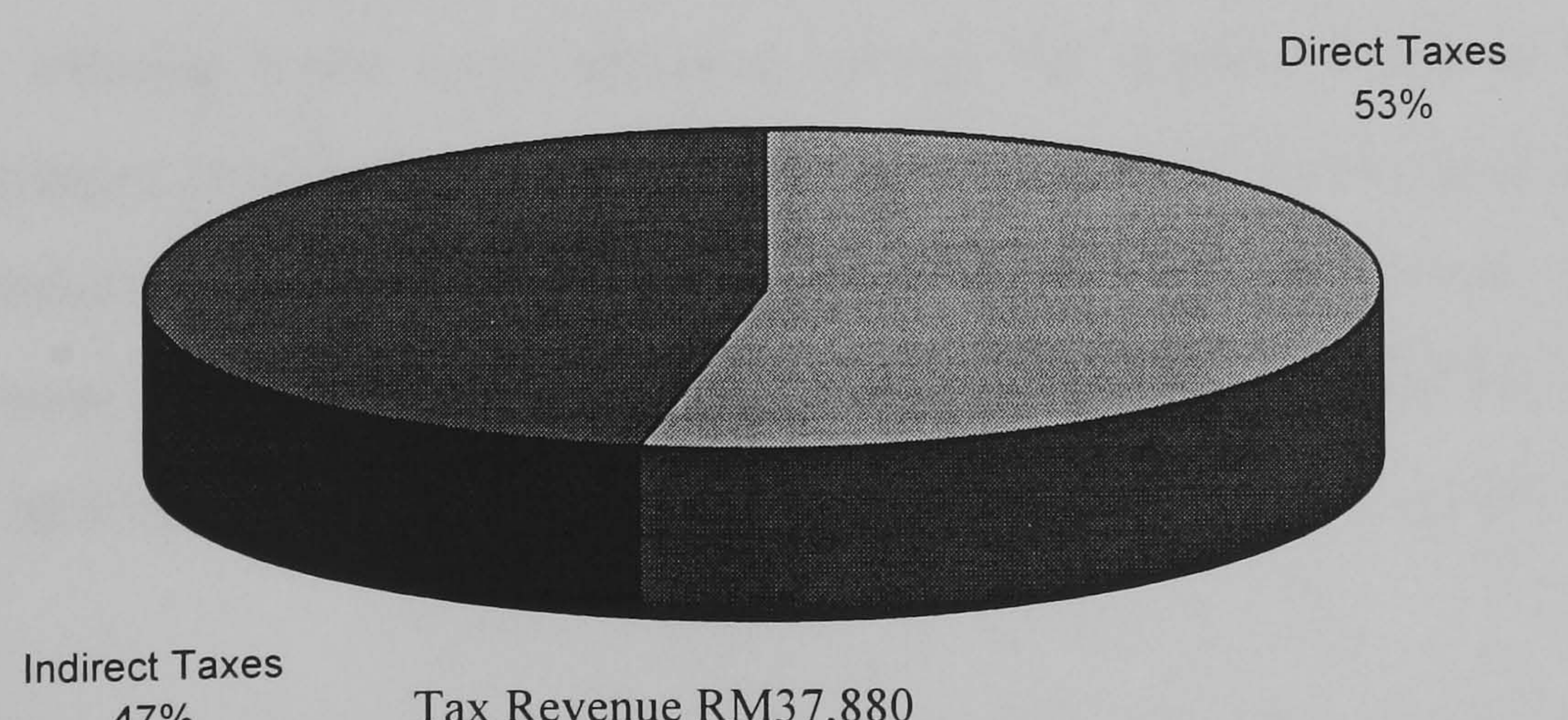
Tax Revenue RM2,000 million

Chart 4.2 Compostition of Tax Revenue, 1980



Tax Revenue RM12,795 million

Chart 4.3 Composition of Tax Revenue, 1995



Tax Revenue RM37,880

and modernisation during the seventies and eighties, the contribution of indirect taxes to total revenue shrank in importance relative to the contribution of direct taxes. Trade taxes as a proportion of total tax revenue declined from 41 percent in 1970 to 18 percent in 1995. This shows the declining importance of primary commodities in total economic activity as well as the effects of the reduction in tariff rates and export duties on commodities. Furthermore, despite the rapid growth of commercial activities and private consumption, the contribution of sales, service and excise taxes to total revenue has not moved in the same direction, but declined in recent years, suggesting the need for a tax reform.

2.1 Incidence of Taxation

The earlier studies on taxation in Malaysia focused on the incidence of taxation on households, which is examining the way in which the burden of tax eventually falls. The first study on the distribution of tax burden in 1957-58 for Peninsular Malaysia was done by Charles E. McLure J.R. Subsequently, D.R. Snodgrass undertook some estimations for 1968 and Ismail Muhd. Salleh for 1973. The three studies showed that the overall tax structure in Peninsular Malaysia exhibited the U-shaped pattern of effective tax rates, with greater burden falling on the lower as well as the upper income households. The tax burden on middle income group was relatively lower.

The estimates of tax incidents were based on some assumptions of who would bear the tax burden and by how much for each of the taxes. The income distribution among households for a particular year was obtained from income and expenditure surveys. The existing taxes were allocated among the income brackets in order to calculate the pattern of effective tax burden. In the allocation of taxes, some assumptions were made about the shifting of the tax burden on the income groups. Since these assumptions were not based on empirical findings of the tax burden but on *a priori* assumptions, incidence estimates of various taxes between the three studies could vary fairly widely.

For instance, Salleh (1980) shows greater regressivity of the tax rates on poor households than the other two studies. The estimate of the effective tax rate for households with annual income below RM1,800 is at a high 47.8 percent in Salleh, compared with 19.9 percent in McLure (1972) and 31.2 percent in Snodgrass (1974). On the other hand, Snodgrass finds that tax progression appears to be most pronounced for households in the higher income brackets. His estimate of the effective tax rate for households with annual income above RM12,000 is 50.8 percent, compared with 40.0 percent in Salleh and 26.3 percent in McLure. The wide difference in the estimations could only be partly attributed to changes in the estimates of income distribution and tax structures between the years 1957-73. The other reason is the difference in assumptions adopted in the studies regarding the shifting of the tax burden between consumers/producers, exporters/importers, producers/distributors, as well as the income groups adopted in each of the studies. The burden of taxes calculated should, therefore, be taken as rough indications of the true patterns and be interpreted with some caution.

2.2 Tax Revenue in an International Context

Table 4.4 shows the contribution of various categories of taxes to total tax revenue for groups of developing countries ranked by per capita GDP, as presented in Tanzi (1987), which are compared with Malaysia's tax structure in 1980. With per capita income of US$1,563, Malaysia falls within the US$850-1699 category of countries, which acts as its reference group. The proportion of tax collection in GDP for Malaysia (at 22.3 percent) was one and a half times higher than for the reference group. This was because Malaysia derived a higher proportion of its taxes from foreign trade and income and corporate taxes. As the world's leading exporter of rubber, tin, palm oil, and tropical hardwoods, as well as petroleum, Malaysia received 20 percent of its tax revenues from export duties and 16 percent from import duties in 1980. By comparison, the countries in the reference group appear to be collecting a higher proportion of their tax revenues in sales tax/VAT and excise duties.

Malaysia's revenue yield compares favourably with other middle-income East Asian countries (Table 4.5). In terms of the ratio of tax revenue to GNP, Malaysia collects more taxes than the other countries in the region. However, in 1989 the difference in the ratio of tax revenue to GNP between Malaysia and countries such as Thailand, Indonesia and South Korea is small, within the range of 0.3-1.3 percentage points. In 1989, Malaysia's ratio of direct taxes to total revenue (at 30.8 percent) is

TABLE 4.4 MALAYSIA'S TAX COLLECTION IN AN INTERNATIONAL CONTEXT

	Malaysia 1980	*All countries in sample*	*Per Capita Income (US$)*			
			0 -349	*350 - 849*	*850 - 1699*	*1700+*
% of GDP						
Foreign Trade	9.0	5.02	4.94	6.62	5.31	3.19
General Sales, VAT	1.3	2.07	1.87	1.43	1.89	3.10
Excises	1.9	1.97	1.64	2.24	1.91	2.16
Income and Corporate	10.1	5.60	2.66	5.50	5.75	8.08
Total Tax	22.3	14.66	11.11	15.79	14.86	16.53
% of Total Taxes						
Foreign Trade	36.2	30.63	39.25	38.06	29.47	15.40
General Sales, VAT	5.4	11.66	14.98	8.63	10.11	12.57
Excises	7.6	12.23	12.86	15.73	11.54	9.95
Income and Corporate	41.0	28.70	19.68	29.55	30.29	35.63

Note: The international data are for early 1980s.
Source: Tanzi (1987), international comparisons; Malaysia's data are calculated from Table 4.6.

higher than Singapore, Thailand and the Philippines, but lower than South Korea and, particularly, Indonesia, which derived more than half of its total revenue from direct taxes. This is due to the high tax revenue that Indonesia derived from its substantial petroleum industry. Malaysia derived 34 percent of its total revenue from non-tax sources, which is higher than the other countries in the region, except Singapore.

Although all countries in the region experienced a decline in the share of taxes derived from trade, the most dramatic decline of 17.2 percentage points was recorded in Malaysia, which resulted from substantial changes in its tax rates on exported and imported goods. The ratio of goods and service tax to total revenue in Malaysia was lower than the other countries in the region. The fact that Malaysia has a lower ratio of goods and service tax to total revenue compared with other countries within a similar income band as well as other countries in the region suggests that this could be a potential area for tax reform.

TABLE 4.5 TAX STRUCTURES OF SELECTED COUNTRIES

	Malaysia		*Singapore*		*Thailand*		*Indonesia*		*Philippines*		*Korea*	
	1972	*1989*	*1972*	*1989*	*1972*	*1989*	*1972*	*1989*	*1972*	*1989*	*1972*	*1989*
Direct tax/Total revenue	27.4	30.8	24.4	20.9	12.1	20.6	45.5	55.9	13.8	26.1	29.0	34.8
Goods & Service tax/Total revenue	n.a.	15.6	17.6	19.5	46.3	45.4	22.8	24.5	24.3	33.2	41.7	32.4
Trade tax/Total revenue	34.9	17.7	11.1	2.7	28.7	22.2	17.6	5.6	23.0	22.7	10.7	10.9
Non-tax rev/Total revenue	22.3	34.0	31.4	45.7	11.2	8.6	10.6	8.3	9.3	14.0	12.6	12.2
Total revenue/GNP	21.1	26.1	21.5	27.5	12.5	17.9	13.4	18.4	12.4	12.8	13.1	18.1
Non-tax revenue/GNP	3.8	8.9	6.8	12.6	1.4	1.5	1.4	1.5	1.2	1.8	1.7	2.2
Tax revenue/GNP	17.0	17.2	14.7	14.9	11.1	16.4	12.0	16.9	11.3	11.0	11.4	15.9

Sources: World Bank, *World Development Report, 1991*
International Monetary Fund, *International Financial Statistics, 1990*
Figures for Malaysia are calculated from the *Economic Report*, various issues

TABLE 4.6 FEDERAL GOVERNMENT REVENUE
(*In RM Million*)

	1970	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*	*1981*	*1982*
Direct Taxes	*701*	*713*	*801*	*890*	*1,384*	*2,021*	*2,167*	*2,946*	*3,323*	*3,888*	*5,664*	*6,328*	*6,405*
Total Income Tax	657	687	741	838	1,305	1,926	2,066	2,791	3,161	3,674	5,240	5,819	6,048
Companies	489	515	559	593	806	1,166	1,170	1,336	1,619	1,717	2,521	2,754	2,613
. Individuals	168	168	182	218	355	438	574	679	771	1,128	983	1,087	1,360
Petroleum		4		27	144	322	322	776	771	829	1,736	1,978	2,075
Other Direct Taxes	44	26	60	52	79	95	101	155	162	214	424	509	357
Indirect Taxes	*1,299*	*1,368*	*1,593*	*2,156*	*2,927*	*2,555*	*3,324*	*4,124*	*4,684*	*5,620*	*7,131*	*7,091*	*6,185*
Export Duties	258	231	232	437	943	625	1,010	1,390	1,463	1,939	2,567	2,225	1,720
Rubber	80	50	49	233	383	121	519	557	716	1,118	1,098	514	110
Tin	130	127	127	130	271	195	291	441	500	545	575	298	159
Palm Oil	18	28	32	50	228	282	166	346	207	236	166	148	75
Petroleum	-	-	-	-	-	-	-	-	-	-	677	1,241	1,354
Other Export Duties	30	26	24	24	61	27	34	46	40	40	51	24	22
Import Duties and Surtax	557	582	589	746	893	801	978	1,140	1,325	1,512	2,061	2,245	2,315
Excise	n.a.	n.a.	n.a.	n.a.	n.a.	450	550	695	849	957	973	967	1,024
Sales Tax	-	-	-	n.a.	n.a.	272	323	383	458	544	696	730	788
Service Tax	-	-	-	-	-	-	-	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Other Indirect Taxes	484	555	772	973	1,091	407	463	516	589	668	834	924	338
Total Tax Revenue	*2,000*	*2,081*	*2,394*	*3,046*	*4,311*	*4,576*	*5,491*	*7,070*	*8,007*	*9,508*	*12,795*	*13,419*	*12,590*
Non-Tax Revenue	*400*	*337*	*525*	*357*	*476*	*541*	*666*	*690*	*834*	*997*	*1,131*	*2,387*	*4,100*
Total Revenue	**2,400**	**2,418**	**2,919**	**3,403**	**4,787**	**5,117**	**6,157**	**7,760**	**8,841**	**10,505**	**13,926**	**15,806**	**16,690**

Source: Ministry of Finance, *Economic Report*, various years.

TABLE 4.6 FEDERAL GOVERNMENT REVENUE (CONT.)
(*In RM Million*)

	1983	*1984*	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Direct Taxes	*7,712*	*8,445*	*9,259*	*8,653*	*6,467*	*7,509*	*7,793*	*10,402*	*13,251*	*15,403*	*17,070*	*18,533*	*20,186*
Total Income Tax	7,262	7,977	8,799	8,279	6,128	7,133	7,292	9,647	12,393	14,382	15,658	16,394	17,825
Companies	3,450	3,432	3,920	3,446	2,783	3,146	3,402	4,497	5,352	7,524	8,551	9,540	10,589
Individuals	1,814	1,975	1,749	1,761	1,812	1,779	2,043	2,506	2,989	3,441	4,248	4,722	5,241
Petroleum	1,998	2,570	3,130	3,072	1,533	2,208	1,847	2,644	4,052	3,417	2,859	2,132	1,995
Other Direct Taxes	450	468	460	374	339	376	501	755	858	1,021	1,412	2,139	2,361
Indirect Taxes	*7,551*	*8,029*	*7,441*	*6,029*	*6,006*	*7,199*	*8,881*	*10,842*	*12,580*	*13,369*	*14,830*	*16,106*	*17,694*
Export Duties	1,892	2,090	1,839	1,141	1,267	1,395	1,588	1,970	2,029	1,689	1,454	1,127	898
Rubber	273	161	3	1	26	168	58	3	0	0	0	0	0
Tin	56	35	38	0	0	0	2	0	0	0	0	0	0
Palm Oil	49	193	93	18	19	10	14	2	4	6	7	19	16
Petroleum	1,477	1,629	1,639	1,076	1,170	1,149	1,432	1,910	1,981	1,646	1,429	1,077	939
Other Export Duties	37	72	66	46	52	68	82	55	44	37	28	31	34
Import Duties and Surtax	2,591	2,697	2,518	2,066	1,934	2,406	2,899	3,420	4,107	4,383	4,566	5,325	6,014
Excise	1,361	1,459	1,376	1,410	1,310	1,536	1,932	2,266	2,849	3,062	3,713	4,118	4,579
Sales Tax	1,284	1,319	1,234	992	1,090	1,456	1,912	2,442	2,763	3,082	3,468	3,733	4,114
Service Tax	n.a.	114	107	60	63	73	94	121	134	322	613	686	757
Other Indirect Taxes	423	350	367	360	342	333	456	623	698	831	1,006	1,117	1,241
Total Tax Revenue	*15,263*	*16,474*	*16,700*	*14,682*	*12,473*	*14,708*	*16,674*	*21,244*	*25,831*	*28,772*	*31,900*	*34,639*	*37,880*
Non-Tax Revenue	*3,345*	*4,331*	*4,414*	*4,836*	*5,670*	*7,259*	*8,599*	*8,277*	*8,222*	*10,478*	*9,791*	*11,053*	*9,761*
Total Revenue	**18,608**	**20,805**	**21,114**	**19,518**	**18,143**	**21,967**	**25,273**	**29,521**	**34,053**	**39,250**	**41,691**	**45,692**	**47,641**

Source: Ministry of Finance, *Economic Report*, various years.

TABLE 4.7 ANNUAL RATE OF GROWTH FOR DIRECT TAXES, 1970-95

(In Percentages)

Year	*Total Direct Taxes*	*Total Income Tax*	*Companies*	*Individuals*	*Petroleum*	*Others*
1971-75	23.6	24.0	19.0	21.1	-	16.6
1976-80	22.9	22.2	16.7	17.5	40.1	34.9
1981-85	10.3	10.9	9.2	12.2	12.5	1.6
1986-90	2.4	1.9	2.8	7.5	-3.3	10.4
1991-95	14.2	13.1	18.7	15.9	-5.5	25.6

Source: Calculated from *Economic Report,* various issues

3. CHANGES IN THE STRUCTURE OF TAXES, 1970-95

Over the last two and a half decade, the Malaysian tax structure had undergone changes as a result of economic transformation as well as tax rate revisions. To get a better understanding of the Malaysian tax system, in this section we shall examine the past trends for each category of taxes. Under direct taxes, we examine (a) personal income tax, (b) corporate tax, and (c) petroleum income tax. As for indirect taxes, we discuss the following: (a) export tax, (b) import tax, (c) excise duties, (d) sales tax, and (e) service tax. Details on the sources of tax revenue for 1970-95 are shown in Table 4.6.

3.1 Direct Taxes

Revenue from total direct taxes recorded rapid growth during the seventies, with growth rates averaging 23 percent per annum. In the eighties, average annual growth of revenue from this source slowed down to 10.3 percent during 1980-85 and 2.4 percent in 1986-90, before picking up again at 14.2 percent in 1991-95 (see Table 4.7). In 1990, income taxes constitute 93 percent of direct taxes and 45 percent of total tax revenue (Table 4.8). These taxes are levied on individuals as well as corporations. Under the Income Tax Act, 1967, personal income tax is levied on the taxable income from all sources accrued in or derived from Malaysia and external income sources received in Malaysia by a resident. These sources include gains or profits from any profession, vocation, or employment, pensions, or annuities, and rents. The residence status of an individual determines claims for personal relief and benefits of graduated rates.[3] Company income tax is levied on the taxable income from all sources in Malaysia and income received from outside Malaysia for a resident company, and on income derived from Malaysia in the case of non-resident companies. Tax is levied for the preceding Year of Assessment (Y/A) ending on December 31.[4]

3.1.1 Personal Income Tax

The schedule of income tax rates for resident individuals is shown in Table 4.9. Individuals face progressive rates of taxes based on thirteen taxable income bands, which were reduced to nine following the 1995 Budget. Starting from the lowest chargeable income category, there are four bands of RM2,500 up to the chargeable income of RM10,000 and three bands of RM5,000 up to the chargeable income of RM25,000, before larger increases in the chargeable income bands for individuals in the higher tax categories.

Since the mid-1980s, the marginal tax rates for the highest and lowest taxable categories have been reduced in stages. In 1985 the top marginal tax rate was reduced from 55 percent to 40 percent, and subsequent reduction brought the top marginal tax rate to 32 percent in 1995. At the lowest taxable category, the marginal tax rate was brought down from 6 percent to 5 percent in 1985 and subsequently to 3 percent in 1995, with the first RM2,500 category of chargeable income exempted from tax. This cut in rates was meant to encourage savings, although its effectiveness on savings has yet to be evaluated. The effect of adjusting the top personal income tax rate on government revenue is minor, notwithstanding the large reduction of marginal tax rate by 15 percentage points for the top taxable income bracket. The share of personal income tax to tax revenue was sustained at around 11-12 percent from 1982-92, before rising to 13.8 percent in 1995. There is only a little fall in the share of personal income tax to tax revenue by 1.5

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[3] Non-resident employees are charged a flat income tax rate of 35 percent, subject to double tax treaty provisions. No personal reliefs are available to non-resident individuals.

[4] Taxes for any Year of Assessment will be charged on the income of the preceding year.

TABLE 4.8 CONTRIBUTION OF DIRECT TAXES TO TAX REVENUE

(In Percentages)

Year	Total Direct Tax	Total Income Tax	Company Tax	Individual Tax	Petroleum Tax	Other Direct Tax
1970	35.1	32.9	24.5	8.4	0.0	2.2
1971	34.3	33.0	24.7	8.1	0.2	1.2
1972	33.5	31.0	23.4	7.6	0.0	2.5
1973	29.2	27.5	19.5	7.2	0.9	1.7
1974	32.1	30.3	18.7	8.2	3.3	1.8
1975	44.2	42.1	25.5	9.6	7.0	2.1
1976	39.5	37.6	21.3	10.5	5.9	1.8
1977	41.7	39.5	18.9	9.6	11.0	2.2
1978	41.5	39.5	20.2	9.6	9.6	2.0
1979	40.9	38.6	18.1	11.9	8.7	2.3
1980	44.3	41.0	19.7	7.7	13.6	3.3
1981	47.2	43.4	20.5	8.1	14.7	3.8
1982	50.9	48.0	20.8	10.8	16.5	2.8
1983	50.5	47.6	22.6	11.9	13.1	2.9
1984	51.3	48.4	20.8	12.0	15.6	2.8
1985	55.4	52.7	23.5	10.5	18.7	2.8
1986	58.9	56.4	23.5	12.0	20.9	2.5
1987	51.8	49.1	22.3	14.5	12.3	2.7
1988	51.1	48.5	21.4	12.1	15.0	2.6
1989	46.7	43.7	20.4	12.3	11.1	3.0
1990	49.0	45.4	21.2	11.8	12.4	3.6
1991	51.3	48.0	20.7	11.6	15.7	3.3
1992	53.5	50.0	26.2	12.0	11.9	3.5
1993	53.5	49.1	26.8	13.3	9.0	4.4
1994	53.5	47.3	27.5	13.6	6.2	6.2
1995	53.3	47.1	28.0	13.8	5.3	6.2

Source: Calculated from *Economic Report,* various issues

TABLE 4.9 INCOME TAX RATES FOR RESIDENT INDIVIDUALS, 1980-95

	Y/A 1980 to Y/A 1984		*Y/A 1985 to Y/A 1990*		*Y/A 1991 to Y/A 1992*		*Y/A 1993 to Y/A 1994*		*Y/A 1995*	
Chargeable Income	*Tax Rate (%)*	*Tax Payable RM*	*Tax Rate (%)*	*Tax Payable RM*	*Tax Rate (%)*	*Tax Payable RM*	*Tax Rate (%)*	*Tax Payable RM*	*Tax Rate (%)*	*Tax Payable RM*
First RM2,500	*6*	150	*5*	125	*4*	100	*2*	50	*0*	0
Next RM2,500	*9*	225	*8*	200	*7*	175	*5*	125	*3*	75
On RM5,000		*375*		*325*		*275*		*175*		
Next RM2,500	*12*	300	*12*	300	*10*	250	*8*	200	*3*	-
On RM7,500		*675*		*625*		*525*		*375*		
Next RM2,500	*15*	375	*12*	300	*10*	250	*8*	200	*6*	300
On RM10,000		*1,050*		*925*		*775*		*575*		*375*
Next RM5,000	*20*	1,000	*15*	750	*12*	600	*10*	500	*6*	-
On RM15,000		*2,050*		*1,675*		*1,375*		*1,075*		
Next RM5,000	*25*	1,250	*15*	750	*12*	600	*10*	500	*7*	700
On RM20,000		*3,300*		*2,425*		*1,975*		*1,575*		*1,075*
Next RM5,000	*30*	1,500	*20*	1,000	*17*	850	*15*	750	*7*	-
On RM25,000		*4,800*		*3,425*		*2,825*		*2,325*		
Next RM10,000	*35*	3,500	*20*	2,000	*17*	1,700	*15*	1,500	*12*	1,800
On RM35,000		*8,300*		*5,425*		*4,525*		*3,825*		*2,875*
Next RM15,000	*40*	6,000	*25*	3,750	*22*	3,300	*21*	3,150	*18*	2,700
On RM50,000		*14,300*		*9,175*		*7,825*		*6,975*		*5,575*
Next RM20,000	*45*	9,000	*30*	6,000	*27*	5,400	*26*	5,200	*23*	4,600
On RM70,000		*23,300*		*15,175*		*13,225*		*12,175*		*10,175*
Next RM5,000	*45*	2,250	*35*	1,750	*32*	1,600	*31*	1,550	*23*	-
On RM75,000		*25,550*		*16,925*		*14,825*		*13,725*		
Next RM25,000	*50*	12,500	*35*	8,750	*32*	8,000	*31*	7,750	*23*	-
On RM100,000		*38,050*		*25,675*		*22,825*		*21,475*		
Exceeding 100,000	*55*		*40*		*35*		*34*		*28*	8,400
										18,575
Next RM50,000	-	-	-	-	-	-	-	-	*31*	25,675
On RM150,000										34,075
Exceeding RM150,000	-	-	-	-	-	-	-	-	*32*	

Notes: 1. In 1995 the top tax bracket was extended to RM150,000 while the categories of tax brackets were reduced from 13 to 9.
2. Taxes for a Year of Assessment (Y/A) are based on the income of the preceding year. For instance, taxes for Y/A 1995 is assessed on the income accrued in 1994.

Sources: 1. The Malaysian Association of Certified Public Accountants, *1994 Budget Commentary & Ready Reckoner*
2. Malaysian Institute of Accountants, *1995 Tax & Business Information Budget News*

TABLE 4.10 PERSONAL INCOME TAX FOR THE YEAR OF ASSESSMENT 1991

Chargeable Income Group	*No. of Persons*	*Chargeable Income*	*Income Tax Charged*	*Development Tax Charged*
1 - 7,500	612,206	2,476,113,542	140,664,569	23,619,744
7,501 - 10,000	130,822	1,136,723,968	85,427,971	6,974,509
10,001 - 15,000	150,840	1,833,931,791	158,195,703	11,060,493
15,001 - 20,000	71,829	1,239,586,974	120,031,534	8,467,197
20,001 - 30,000	73,672	1,794,212,973	202,770,433	11,764,762
30,001 - 50,000	49,648	1,879,313,147	261,865,355	12,592,459
50,001 - 100,000	27,254	1,842,882,398	353,092,063	12,197,456
100,001 - 200,000	7,630	1,021,134,900	266,218,638	5,851,485
Over 200,000	2,564	870,855,439	274,422,777	4,090,920
Total	*1,126,465*	*14,094,755,132*	*1,862,689,043*	*96,619,025*

***Source*:** Department of Inland Revenue, *Annual Report* 1991

percentage points in 1985, though this also partly contributed by reduced earnings with the onset of a recession.

Table 4.10 and Table 4.11 show the personal income tax by categories of income and tax payers for the Year of Assessment 1991. These tables are useful in providing a snapshot of the personal income tax structure at the start of the nineties, which was in the middle of the series of marginal tax rate revisions starting from 1986. Fifty four percent of the personal income tax payers came from the lowest chargeableincome group butthey only contribute 8.3 percent of income and development tax.[5] By comparison, 0.9 percent of the tax payers were from the two highest tax categories and contribute 28 percent of income and development tax. There could possibly be efficiency gains by exempting those from the lowest tax brackets in order to free up the over-strained tax administrative and collection capacity of the Department of

[5] Development Tax is levied on income derived from any trade, business, profession, vocation, and the leasing of property situated in Malaysia. Individuals and members of partnerships who derived a development source of income not exceeding RM5,000 are exempted from this tax.

TABLE 4.11 PERSONAL INCOME TAX BY CATEGORIES OF TAXPAYERS, YEAR OF ASSESSMENT 1991

	No. of Persons Assessed	*Total Income*	*Tax Charged*
1. Employees	817,598	15,973,412,486	1,226,496,691
(i) Government	345,453	5,770,445,750	305,290,339
(ii) Non-Government	472,145	10,202,966,736	921,206,352
2. Sole Proprietors and Partners	396,644	7,643,932,269	636,190,719
Total	*1,214,242*	*23,617,344,755*	*1,862,687,410*

Source: Department of Inland Revenue, *Annual Report* 1991

Inland Revenue, coupled by increased efforts to improve the assessment and collection of the 'hard to tax' groups. This could be the underlying motive for exempting the lowest tax category in the revision of income tax rates for Y/A 1995.

Table 4.11 shows that there were 1,214,000 taxpayers in 1990 (or Y/A 1991) who constituted about 18 percent of those employed. About two-thirds of the taxpayers were employees and one-third while sole-proprietors and partners. The salaried employees are the 'easy-to-tax' group since their earnings are reported by the employer to the Department of Inland Revenue (DIR). There is a high representation of government employees who are taxpayers (28 percent) as against their share in total employment (13 percent). As is commonly experienced in every country, the 'hard-to-tax' group is the self-employed who comprise 33 percent of the taxpayers in 1990. Not very much is known about the extent of tax compliance among the 'hard-to-tax' group and further research could possibly be done in this area.

In examining income tax structure among countries, analysts have traditionally used the share of total tax revenue to GDP. As a refinement to the methodology, the total tax revenue accrued from households at different income levels could be compared. The

TABLE 4.12 MARGINAL TAX RATES OF SELECTED COUNTRIES, 1984-85

Countries	*Tax Threshold Index (Y*/FGDP)*	*MTR on First Bracket (%)*	*MTR on 3/4 FGDP*	*MTR on FGDP*	*MTR on 2FGDP*	*MTR on 3GDP*	*MTR on Highest Bracket (%)*	*Ratio of Highest Bracket to FGDP*
Malaysia	*0.65*	*6.0*	*20.0*	*25.0*	*35.0*	*45.0*	*55.0*	*4.23*
Indonesia	1.29	15.0	0.0	0.0	15.0	15.0	35.0	22.43
Philippines	0.44	1.0	7.0	11.0	15.0	19.0	35.0	13.65
Thailand	0.47	7.0	7.0	7.0	17.0	22.0	65.0	21.35
Korea, Rep.	0.39	7.1	10.6	14.0	31.0	44.6	70.1	8.06
Singapore	0.08	3.6	22.5	27.0	32.0	36.0	40.5	10.66
Japan	0.11	14.5	44.0	50.0	71.0	77.0	84.0	6.93

Source: Figures for Malaysia are the author's own estimations for Year of Assessment 1984.
Figures for other countries are from Sicat and Virmani (1988);

problem of focusing on the highest marginal rate is that it can give a misleading picture of the overall disincentives created by the tax system in a country. In this section, we adopt the approach introduced by Sicat and Virmani (1988) to compare the income tax base and the incentive effects of marginal tax rates among selected countries. We then apply the same methodology to examine Malaysia's changing income tax rates over the past 10 years.

For an average household, the method assumes a married couple with one income earner and three children. To obtain the taxable income, we subtract from gross income the standardised deductions and credits related to the family or linked to wage and salary income. The country's 'one household GDP' (FGDP) is defined as five times per capita GDP.[6] The *tax threshold index* is calculated by taking the ratio of the threshold income level over the one household GDP, i.e. Y*/FGDP. The numerator, Y*, is the income threshold that is free from tax. It is equal to the income bracket that is free from tax plus the basic exemptions.[7] A zero tax threshold index means that all families, regardless of their income level, will be taxed. If the value is 0.5, families with an income of less than half FGDP are not subject to tax, while families with income equal to FGDP pay a tax assessed on half their income. In other words, the greater the value of the index (arising from larger deductions, credits, and zero bracket), the smaller would be the income tax base.

Table 4.12 presents Malaysia's marginal tax rates (MTR) together with those of Indonesia, Philippines, Thailand, the Republic of Korea, Singapore, and Japan. The figures for Malaysia are our own estimates, while the figures for the other countries are based on Sicat and Virmani. In 1984-85, Indonesia had an exceptionally high index value, where families having income equal to 1.3 times the FGDP were not taxed. Indonesia's low tax base is consistent with the high administrative costs of collecting taxes from a large, populous country comprising thousands of islands. Malaysia had the next highest tax threshold index in view of the large tax relief given to income earners.

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6 It is useful to note that this methodology tends to overestimate the average and marginal tax rates of developed countries since they typically have families of less than five. Although FGDP may overestimate mean family income, this bias is not likely to distort the overall inter-country comparison.

7 For Malaysia, the tax free income bracket is RM2,500 before 1994 and RM5,000 after 1994. The estimated personal relief of a family of five with a working husband, a non-working wife and three children are RM12,900 for 1984 and 1990, RM13,900 for 1991 and 1993, and RM15,400 for 1995.

On the other hand, the threshold index for Singapore was very low, which was even lower than Japan. Its wide income tax base reflects the relative higher efficiency in collecting taxes in an integrated city-state, island economy.

In the discussions on comparative tax rates among countries, analysts often focus on the highest marginal tax rate since very high marginal tax rates are linked with the disincentives to work and save. Before drawing conclusions about the disincentive effects on the basis of the highest tax rate among countries, it will be useful to ascertain the size of the target group that falls within this tax bracket. In Table 4.12, the highest tax brackets for Thailand (65 percent) and Indonesia (35 percent) only apply to families with income at more than 20 times the size of their FGDP. One can safely conclude that only a tiny fraction of individuals fall within this tax category and even less would pay taxes at this rate because of tax evasion. Another set of indicators is to examine the marginal tax rate for those up to three times the size of FGDP. Families belonging to this income bracket are in the upper middle class or the high income bracket. The table shows that the Philippines, Thailand and Indonesia had the lowest marginal tax rates for households in this category.

Among the neighbouring developing countries, Malaysian tax payers face the highest marginal tax rates in 1984. Although the tax threshold index was high in Malaysia, the highest tax brackets were reached very quickly. Individuals with family income three-quarters the national average for one household GDP paid 20 percent taxes, while those with three times FGDP paid 45 percent taxes. The highest tax bracket was applied to those with income of more than 4.2 times FGDP. This bracket was reached faster than the other developing countries in the table.

After comparing the tax structure of selected countries, we now examine the progressivity of Malaysia's personal income tax. Table 4.13 presents the indicators of progressivity calculated for 1984, 1990, 1991, 1993 and 1995 using the methodology by Sicat and Virmani (1988). The table shows that there had been considerable reform of personal income tax in Malaysia during the last decade or so. The declining tax threshold index shows that the tax base had been expanding over the years. In 1984 families with incomes less than 65 percent of FGPD did not pay taxes. The tax net was wider a decade later; only those with family income less than 44 percent of FGDP were tax exempted.

TABLE 4.13 PROGRESSIVITY OF PERSONAL INCOME TAX, 1984-95

Tax Year	*Lowest rate (%)*	*Top rate (%)*	*At 1/2 FGDP*		*At 1 FGDP*		*At 2 FGDP*		*At 3 FGDP*	
			ATR (%)	*MTR (%)*	*ATR (%)*	*MTR (%)*	*ATR (%)*	*MTR (%)*	*ATR (%)*	*MTR (%)*
1984	6	55	11.2	15	17.8	25	26.6	35	33.4	45
1990	5	40	10.1	12	14.6	20	19.3	25	24.4	35
1991	4	35	9.4	12	12.6	17	14.1	22	22.6	32
1993	2	34	7.9	10	11.4	15	19.0	31	23.0	31
1995	3	32	5.6	7	9.2	12	18.8	23	23.3	28

Tax Year	*FGDP (RM)*	*Tax Threshold Index (Y*/FGDP)*	*Ratio of Highest Bracket to FGDP*	*Progressivity Index*		*Elasticity Index (MTR/ATR)*		
				ATR at 2FGDP/ ATR at 1FGDP	*ATR at 3FGDP/ ATR at 2FGDP*	*At 1FGDP*	*At 2 FGDP*	*At 3FGDP*
1984	23629	0.65	4.4	1.5	1.3	1.4	1.3	1.3
1990	29479	0.52	3.3	1.3	1.3	1.4	1.3	1.4
1991	32536	0.50	3.1	1.4	1.3	1.4	1.3	1.4
1993	39726	0.41	2.5	1.7	1.2	1.3	1.6	1.3
1995	46581	0.44	3.2	2.0	1.2	1.3	1.2	1.2

Notes: 1. *Definitions*: FGDP = One Household GDP. It is the per capita GDP multiplied by the approximate average household size of 5.
ATR = Average Tax Rate.
MTR = Marginal Tax Rate.
Y* = Income threshold above which a positive tax payment must be made.

2. The tables above are calculated using the Malaysian macroeconomic data, tax rates and exemptions.

3. On account of Malaysia's prior-year assessment system, the macroeconomic data for the year before are used to establish the FGDP for the tax years. For instance, data for 1994 and 1994 are used for the tax years 1993 and 1995.

One reason for this is that the rapid rise in average family GDP that brought many families into the taxable income brackets or the problem of 'bracket creep'.

Second, the personal relief schedule had changed very little since 1980 despite the increase of around 40 percent in the price level between 1980-90. For instance, a working individual with four dependants and who earned RM12,900 in 1980 would not be paying any tax. However, if he was to earn the same amount of real income in Y/A 1984, he would fall into the 6 percent tax bracket. The same real income would bring him into the 8 percent bracket in Y/A 1990 and the 10 percent bracket in Y/A 1991. In other words, he would indeed be worse off since the rising nominal income would move him into successively higher tax brackets. However, the situation is reversed with the latest tax rate revisions. The increase in personal relief and reduction of tax rates in the nineties would bring him down the 8 percent bracket in Y/A 1993 and the 0 percent bracket in Y/A 1995.

There is also a substantial compression of marginal tax rates. The ratio of the highest bracket to FGDP falls from 4.2 in 1984 to 3.2 in 1995. This implies that individuals reach the highest tax bracket earlier in 1995 than a decade before. However, this trend is also accompanied with falling marginal tax rates, including the highest tax bracket, over time. This is shown by the declining marginal tax rates at each multiple of FGDP in Table 4.13. Marginal tax rates fell between 12 to 17 percentage points for the first three multiples of FGDP.

The *Progressivity Index* shows the effective progressivity between multiples of FGDP. The progressivity for tax payers in the middle income and medium-high income category had increased from 1.5 ten years before to 2.0 in 1995. By contrast the progressivity index of those in the medium-high and high income category had remained relatively unchanged. The *Elasticity Index* shows the relationship between marginal and average tax rates. The index shows that the Malaysia's tax rates are structured such that the elasticities remained fairly constant between 1.2-1.4 for the first three multiples of average family income between Y/A 1984-1995.

Horizontal equity is violated when similar taxpayers are not treated in a like fashion as a result of uneven enforcement of tax compliance across different classes of taxpayers and types of income. From the Household Income Survey 1989, the number of households that are estimated to pay taxes are between 1.2 and 1.3 million although about 1.0 million households are assessed for income tax, implying a participation rate of 78 percent to 85 percent. The majority of those who pay taxes are on employment rolls. However, there are under-reporting of income among those who are not on these rolls, which suggests that there is uneven coverage of the personal income tax. It has yet to be established whether different segments of society bear a disproportionately high or low share of the burden.

3.1.2 Corporate Income Tax

Corporations are levied a flat tax rate on their undistributed profits. There is some degree of integration between personal and corporation taxes, where dividends are taxed once and individuals are allowed credit for taxes paid by the corporation on their behalf. Corporate taxation has long been an important source of government revenue. It contributed about 25 percent of tax revenue in 1970, but its share dropped to around 20 percent from 1973 through 1991, before rising to above 26 percent in the early 1990s. To increase government revenue during economic recession in the mid-seventies, the corporate and development tax rates were adjusted upwards from 45 percent to 50 percent in 1975. The 5 percent increase was because of the imposition of the excess profit tax, which was abolished in Y/A 1988. The 50 percent tax rate was maintained for a decade before the downward rate revisions, starting from Y/A 1986 to reach 30 percent in Y/A 1995 (see Table 4.14). This process of lowering the corporate tax rate was to bring it more in line with the taxes of neighbouring countries.[8] Despite the rate adjustments, the contribution of corporate tax to the Malaysian government tax revenue rose from 23 percent in 1986 to 28 percent in 1995. Clearly, the tax revenue accrued from the rapid rise in business activities and corporate profits had more than compensated for the revenue loss from the tax rate adjustments.

[8] The corresponding corporate tax rates in the ASEAN countries are 27 percent for Singapore, 30 percent for Thailand, Brunei, and Indonesia, and 35 percent for the Philippines.

TABLE 4.14 CORPORATE INCOME TAX RATES

(In Percentages)

Year of Assessment	*Income Tax Rate*	*Development Tax Rate*	*Excess Profit*	*Total Rate*
1985 and before	40	5	5	50
1986-1987	40	5	3	48
1988	40	5	-	45
1989	35	5	-	40
1990	35	4	-	39
1991	35	3	-	38
1992	35	2	-	37
1993	34	0	-	34
1994	32	0	-	32
1995	30	0	-	30

Note: During Y/A 1975 to Y/A 1985 excess profit tax of 5 per cent was charged on income in excess of (i) 25 per cent of shareholders funds at the beginning of the basis period or (ii) RM200,000, depending on which is greater. For Y/A 1986 and Y/A 1987, a 3 per cent excess profit tax was imposed on chargeable income in excess of RM2 million. This tax was abolished from Y/A 1988.

The structure of the corporate tax for Y/A 1991 by income groups is shown in Table 4.15. A total of 30,400 companies were levied income tax amounting to RM5.2 billion. Most of the companies were resident in Malaysia, and slightly over 1 percent were non- resident. Over half of the companies had chargeable incomes of RM30,000 and below and they contributed about 1 percent of the corporate tax revenue. By contrast, close to four-fifths of the corporate tax revenue were derived from companies with chargeable income of RM2,000,000 and above. The companies constituted less than 3 percent of the total number of total number of companies. The non-resident companies contributed 7 percent of the corporate tax revenue.

As part of the overall strategy to generate increased industrial activities and attract foreign direct investment (FDI), Malaysia expanded its income tax incentives in 1986. Awarded on a discretionary basis, these incentives reduce the corporate taxes paid through tax holidays, allowances, abatements and special deductions. While the corporate tax system in Malaysia is relatively straight forward, various complications can arise from the elaborate tax incentive system. The principal incentives for the

TABLE 4.15 CORPORATE CHARGEABLE INCOME AND INCOME TAX, Y/A1991

Chargeable Income	*Number of Companies*			*Chargeable Income (RM)*			*Chargeable Tax (RM)*	
Groups (RM)	*Total*	*Resident*	*Non-Resident*	*Total*	*Resident*	*Non-Resident*	*Resident*	*Non-Resident*
Below 10,000	9,251	9,158	93	35,980,626	35,771,276	209,350	13,392,468	79,552
10,001 - 20,000	4,430	4,400	30	64,141,461	63,708,748	432,713	23,989,236	160,412
20,001 - 30,000	2,526	2,513	13	62,597,293	62,262,689	334,604	23,436,043	123,600
30,001 - 50,000	3,118	3,099	19	122,580,868	121,847,810	733,058	45,924,090	275,113
50,001 - 100,000	3,708	3,671	37	263,630,528	260,890,134	2,740,394	98,231,072	1,031,937
100,001 - 250,000	3,311	3,267	44	522,795,872	515,509,113	7,286,759	193,972,725	2,707,784
250,001 - 500,000	1,547	1,507	40	548,133,870	533,608,132	14,525,738	200,358,565	5,467,288
500,001 - 1,000,000	1,003	972	31	705,985,902	685,096,101	20,889,801	256,953,764	7,727,880
1,000,001 - 2,000,000	620	595	25	860,706,555	826,104,205	34,602,350	309,621,890	12,969,662
Over 2,000,000	880	841	39	11,830,353,277	10,863,078,377	967,274,900	4,038,913,803	362,731,968
Total	*30,394*	*30,023*	*371*	*15,016,906,252*	*13,967,876,585*	*1,049,029,667*	*5,204,793,656*	*393,275,196*

Note: 'Chargeable Tax' includes both Corporate Income Tax and Development Tax.
Source: Department of Inland Revenue, *Annual Report 1991*

manufacturing sector are contained in the Promotion of Investments Act (PIA), 1986 and the Income Tax Act, 1967. Among some of the most important forms of tax incentives available are the following:[9]

(a) Pioneer Status for investments in agriculture, industrial and hotel;

(b) Investment Tax Allowance for companies producing 'promoted products';

(c) Industrial Adjustment Allowance which allow specific manufacturing companies in textile, wood, motor cars, shipbuilding, oil palm and bar and rod rollings;

(d) Abatements to companies which are not claiming the ITA or pioneer status;

(e) Reinvestment Allowance for manufacturing companies which incur qualifying capital expenditure for the purpose of an approved expansion; and

(f) Specific export and other incentives.

One can reasonably raise questions on the extent to which Malaysia's tax incentives have helped either to increase inward FDI or give domestic firms an edge in world trade competition. It is, however, difficult to attribute or measure the contribution of particular incentives to increase foreign direct investment. Most developing countries prefer to have high nominal rates of corporation tax and then grant exemptions selectively which erode the marginal effective tax rate. In surveying tax incentives across twenty-eight developing countries, Shah and Toye (1978) note that as opposed to theory, tax holidays and tax credits, subsidies to earnings and subsidies to investment are not alternatives, in practice. Firms could be allowed to opt and benefit under one scheme or the other, according to which would provide the greater subsidy. To gain maximum benefit from the tax and incentive schemes, firms would take advantage of their tax holidays until their expiry, and then enjoy the different kinds of depreciation allowance and tax credit available. The most popular incentive scheme is the tax holiday which provides the largest element of subsidy to firms which earn profits (Heller and Kauffman,

9 The full range of investments available are listed and described in the 'Investors' Guide' of the *Economic Report*.

1963: 85; Usher, 1977, 131-32). The basic tax holiday is extended and supplemented by other types of tax concessions.

It is important to consider the interaction of incentives since some incentives can render others ineffective. In examining the incremental effects of incentives, Pellechio, Sicat and Dunn (1987a) found that five-year tax holiday and import tax exemption eliminated the beneficial effect of an investment deduction. When the benefits of tax incentives occur at the same time some of them become redundant. The problem of indiscriminate granting of tax incentives is that they erode the tax base and may not promote the desired mix of investments. For policy making, it is important to know about the exact impact of tax incentives on the effective tax rates faced by investors, on the composition of overall investment, and on the substitution of the factors of production. The lack of knowledge in these areas, as is often the case, can lead to the creation of an excessive number of incentive instruments.

In their study on the taxation of investment in East Asian countries, Pellechio, Sicat and Dunn (1987a) show that the statutory (or nominal) corporate income tax rate gives a misleading picture of the true effective tax rate, which is modified by significant deductions allowed for depreciation, investment allowances, and income abatement. The tax rate is further reduced by a five-year tax holiday applicable to companies with pioneer status. In addition, favourable treatment of capital gains and an offset against personal income taxes of corporate taxes paid on dividend receipts act to lower the tax burden. One way of assessing the impact of corporate taxes is through the use of a simulation model developed in the World Bank.[10] By using purely hypothetical data based on actual parameters of the tax system and the average capital composition of investment projects, this model computes a cash-flow stream before taxes and after taxes. Allowances are made for depreciation, interest deductions, loss offsets, capital gains, personal income tax credits against dividend payouts and other features. The percentage

[10] See A. Pellechio, G. Sicat and D. Dunn, 'Taxation of Investment in East Asian Countries,' DRD Discussion Paper No. 261, World Bank, March 1987.

TABLE 4.16 MARGINAL EFFECTIVE TAX RATES IN SELECTED EAST ASIAN COUNTRIES

(In Percentages)

Country	Statutory Rate	*Marginal Effective Tax Rate* All equity	50% Debt
Malaysia	40.0	32.0	20.5
Singapore	40.0	28.4	15.2
Philippines	35.0	40.4	31.9
Indonesia	35.0	41.6	34.1
Thailand	35.0	24.9	18.6
Japan	33.3	39.2	29.4
Korea	30.0	33.1	24.6
Taiwan	25.0	31.9	28.2
Hong Kong	18.5	17.3	9.6

Source: Pellechio, Sicat and Dunn, 'Taxation of Investment in East Asian Countries' DRD Discussion Paper No. 261, World Bank, March 1987.

TABLE 4.17 TAX REVENUE FROM PETROLEUM, 1987-1989

(In RM Millions)

	1988	*%*	*1989*	*%*	*1990*	*%*
Petroleum Income Tax	2,208	*30.08*	1,847	*24.11*	2,884	*32.3*
Export Duty	1,149	*15.65*	1,432	*18.69*	1,910	*21.4*
Royalty	499	*6.80*	509	*6.64*	627	*7.0*
Petroleum Dividend	2,000	*27.25*	2,300	*30.03*	2,300	*25.8*
Petroleum Import & Excise Duties	1,458	*19.86*	1,548	*20.22*	1,183	*13.2*
Share of Petroleum Revenue	27	*0.36*	24	*0.31*	27	*0.30*
Revenue Derived From Petroleum	7,341	*100.00*	7,660	*100.00*	8,931	*100.0*

Source: Ministry of Finance, *Estimates of Malaysia's Federal Revenue*, various years.

difference in the rate of return generated by the before-tax and after-tax streams is designated the marginal effective tax rate (METR).

The simulation results of the METR of Malaysia and the other Asian countries are shown in Table 4.16. Malaysia's METR is significantly lower than its statutory rates, especially if debt financing is used. These calculations only consider the minimum allowances accorded to companies. If other deductions and exemptions are included, the rate can decline further. For instance, a pioneer company with a 5-year exemption using 50 percent debt financing would face a METR of only 15 percent. If losses from a project can be used to offset income earned elsewhere in the corporation, then the METR falls to 10 percent. If the pioneer status is extended from 5 to 10 years, the METR falls to a minimal of 4 percent. On this basis, one can conclude that Malaysia's effective tax rate is low enough not to discourage new investments, a statement that is supported by Tahir (1984).

For many new companies that qualify for pioneer status, the tax burden has been so much reduced by major incentives that they could afford to overlook minor credits and deductions, such as the Labour Utilisation Relief (now abolished) and the Double Deduction for Training. Besides the pioneer status, companies can also opt for the Investment Tax Allowance (ITA), which tends to be favoured by large, capital-intensive projects, or the Reinvestment Allowances and accelerated depreciation allowances under the provisions of the Income Tax Act. The low effective tax rate on capital as the result of the incentives may have contributed to an erosion of the tax base as well as the unintended consequence of biasing projects towards more capital-intensive techniques (World Bank, 1989). A tax structure with fewer exemptions would permit more effective, selective tax incentives than the present system.[11] In addition, the lowering of the statutory tax rate from 45 percent to 30 percent would need to be accompanied with the

[11] One of the most dramatic reform of investment incentives in the eighties occurred in Indonesia. Before 1983 its tax structure was inordinately complex as a result of hundreds of ad hoc amendments such that they were incomprehensible to taxpayers and tax collectors alike. The massive range of contradictory investment incentives resulted in a complicated system that was ineffective in raising revenue. In reforming its taxes, Indonesia abolished all special tax incentives, including tax holidays, investment allowances, and accelerated depreciation. This reform resulted in administrative simplicity, transparency, and minimum distortion of economic behaviour. The expected revenue gains arising from the elimination of incentives allowed the tax rate to be reduced (World Bank, 1988; Gillis, 1989).

removal of exemptions and investment allowances, without which the METR would fall below zero (World Bank, 1989: 71).

3.1.3 Petroleum Income Tax

Oil production in Malaysia started in 1911, but only grew in importance in the early 1970s. Since the mid-seventies, the contribution of petroleum production to government finance grew in importance. The share of petroleum income tax to total tax revenue rose from 7 percent in 1975 to 21 percent in 1986, before declining to 5 percent in 1995. Besides petroleum income tax, there are other sources of tax revenue derived from petroleum, such as export duty, petroleum royalty and dividend, as well as import and excise duties. In 1990 taxes and duties on petroleum contributed RM8.9 billion to Federal Government revenue (Table 4.17). Petroleum income tax accounted for 9.9 percent of government revenue, followed by petroleum dividend (7.9 percent), the export duty on petroleum (6.6 percent) and the petroleum royalty (2.2 percent).

Petroleum exploitation in the seventies influenced developments in the Malaysian economy in a number of ways. Firstly, the share of the mining sector to GDP in 1990 is far more important than anticipated in the Outline Perspective Plan, with the petroleum sector emerging as the main contributor to the sector. The share of petroleum to the mining sector increased from 16.5 percent in 1970 to 82.6 percent in 1990 export commodity in the early 1980s, although its position and export value deteriorate relative to palm oil exports in the early 1990s. Thirdly, the buoyant petroleum prices in the late seventies and early eighties provided the government with revenue to finance ambitious public sector programmes. However, the sudden fall in oil prices in 1986 caused a decline in federal revenue and a cutback in public expenditure, which accentuated the recession in the mid-eighties.

Malaysia abandoned the concessions system in favour of a system of production-sharing contracts with foreign oil companies as specified in the Petroleum Development Act 1974. Petronas, which was established under this Act, is vested the ownership of all petroleum resources as well as the exclusive rights for exploration and production. The production-sharing contracts specify the details with regard to the sharing of risks, profits, and control over the different phases of the project: exploration, development and

TABLE 4.18 ANNUAL RATE OF GROWTH OF INDIRECT TAXES, 1970-95

(In Percentages)

Year	*Total Indirect Taxes*	*Rubber*	*Tin*	*Palm Oil*	*Petroleum*	*Import Duties*	*Excise*	*Sales Tax*	*Service Tax*
1971-75	14.5	8.6	8.4	73.4	-	7.5	12.5	-	-
1976-80	22.8	55.4	24.1	-10.1	-	20.8	16.7	20.7	-
1981-85	0.9	-69.3	-41.9	-10.9	19.3	4.1	7.2	12.1	-
1986-90	7.8	0.0	-100.0	-53.6	3.1	6.3	10.5	14.6	2.5
1991-95	10.3	-100.0	-	51.6	-13.2	12.0	15.1	11.0	44.3

Source: Calculated from *Economic Report,* various issues

TABLE 4.19 CONTRIBUTION OF INDIRECT TAXES TO TAX REVENUE
(In Percentages)

Year	*Total Indirect Tax*	*Export Duties*	*Rubber*	*Tin*	*Palm Oil*	*Petrol*	*Other Export Duties*	*Import Duties*	*Excise Duties*	*Sales Tax*	*Service Tax*
1970	65.0	12.9	4.0	6.5	0.9	0.0	1.5	27.9	-	-	-
1971	65.7	11.1	2.4	6.1	1.3	0.0	1.2	28.0	-	-	-
1972	66.5	9.7	2.0	5.3	1.3	0.0	1.0	24.6	-	-	-
1973	70.8	14.3	7.6	4.3	1.6	0.0	0.8	24.5	-	-	-
1974	67.9	21.9	8.9	6.3	5.3	0.0	1.4	20.7	-	-	-
1975	55.8	13.7	2.6	4.3	6.2	0.0	0.6	17.5	9.8	5.9	0.0
1976	60.5	18.4	9.5	5.3	3.0	0.0	0.6	17.8	10.0	5.9	0.0
1977	58.3	19.7	7.9	6.2	4.9	0.0	0.7	16.1	9.8	5.4	0.0
1978	58.5	18.3	8.9	6.2	2.6	0.0	0.5	16.5	10.6	5.7	0.0
1979	59.1	20.4	11.8	5.7	2.5	0.0	0.4	15.9	10.1	5.7	0.0
1980	55.7	20.1	8.6	4.5	1.3	5.3	0.4	16.1	7.6	5.4	0.0
1981	52.8	16.6	3.8	2.2	1.1	9.2	0.2	16.7	7.2	5.4	0.0
1982	49.1	13.7	0.9	1.3	0.6	10.8	0.2	18.4	8.1	6.3	0.0
1983	49.5	12.4	1.8	0.4	0.3	9.7	0.2	17.0	8.9	8.4	0.0
1984	48.7	12.7	1.0	0.2	1.2	9.9	0.4	16.4	8.9	8.0	0.7
1985	44.6	11.0	0.0	0.2	0.6	9.8	0.4	15.1	8.2	7.4	0.6
1986	41.1	7.8	0.0	0.0	0.1	7.3	0.3	14.1	9.6	6.8	0.4
1987	48.2	10.2	0.2	0.0	0.2	9.4	0.4	15.5	10.5	8.7	0.5
1988	48.9	9.5	1.1	0.0	0.1	7.8	0.5	16.4	10.4	9.9	0.5
1989	53.3	9.5	0.3	0.0	0.1	8.6	0.5	17.4	11.6	11.5	0.6
1990	51.0	9.3	0.0	0.0	0.0	9.0	0.3	16.1	10.7	11.5	0.6
1991	48.7	7.9	0.0	0.0	0.0	7.7	0.2	15.9	11.0	10.7	0.5
1992	46.5	5.9	0.0	0.0	0.0	5.7	0.1	15.2	10.6	10.7	1.1
1993	46.5	4.6	0.0	0.0	0.0	4.5	0.1	14.3	11.6	10.9	1.9
1994	46.5	3.3	0.0	0.0	0.1	3.1	0.1	15.4	11.9	10.8	2.0
1995	46.7	2.4	0.0	0.0	0.0	2.5	0.1	15.9	12.1	10.9	2.0

Source: Calculated from *Economic Report*, various issues

Figure 4.4 Direct Taxes as Share of Tax Revenue

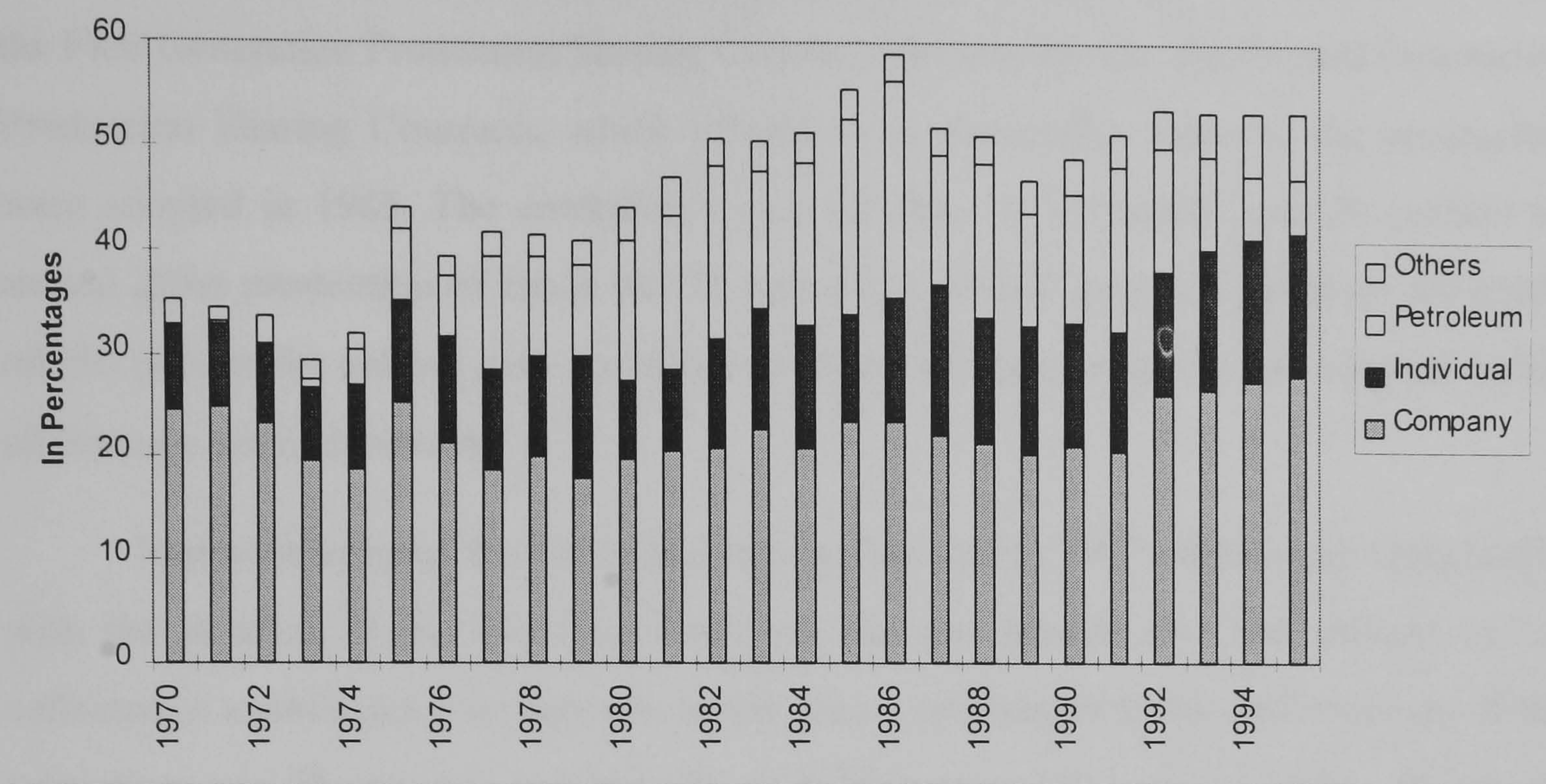
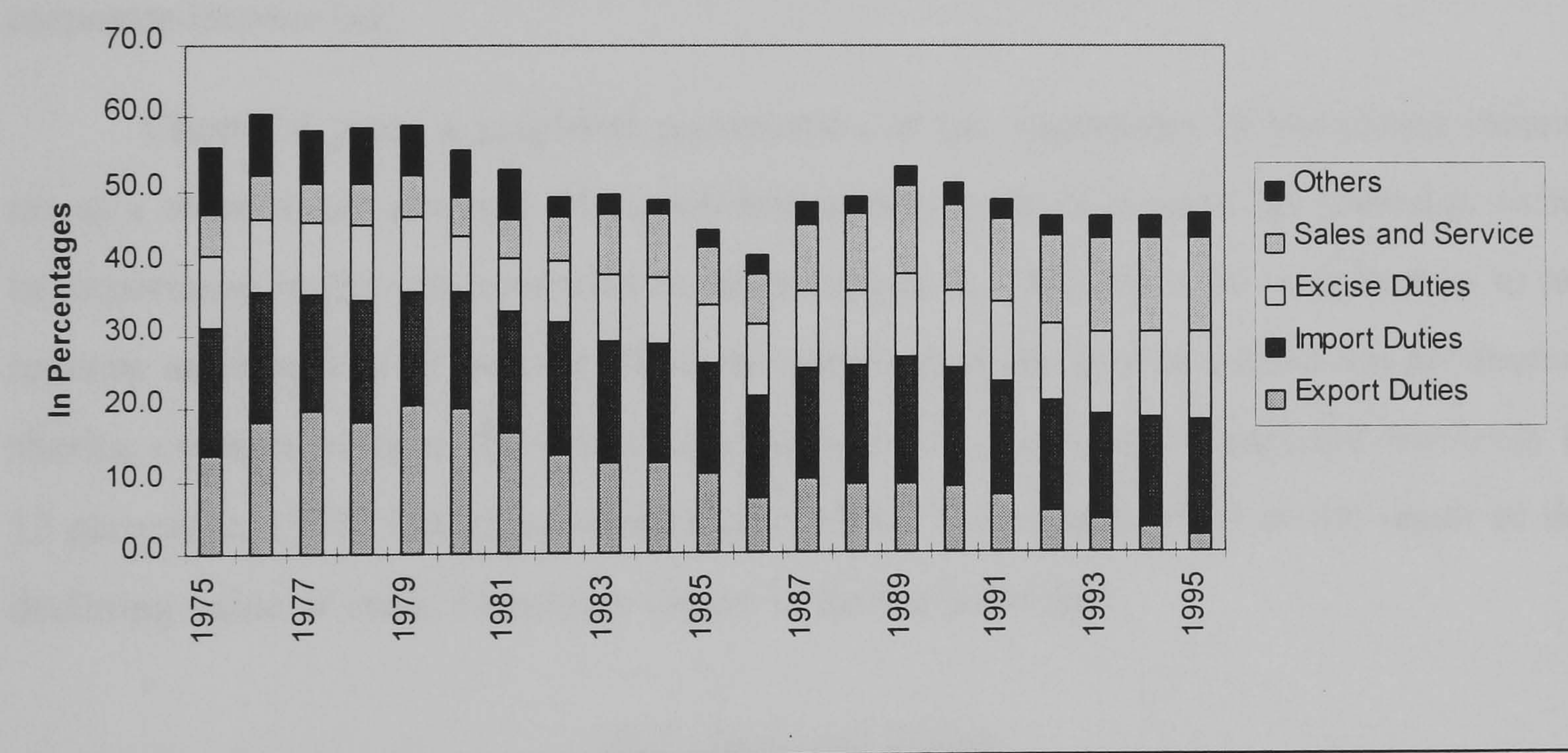


Chart 4.5 Indirect Taxes as Share of Total Tax Revenue



extraction. The contracts are supplemented by the Petroleum Income Tax under which the contractor and Petronas are subject to 45 percent income tax on revenues. After using the First Generation Production Sharing Contracts for one decade, the Second Generation Production Sharing Contracts, which offered more favourable terms to the contractor, were adopted in 1985. The contractor's cost oil share is increased from 20 percent of annual gross production of crude oil (25 percent of natural gas) to 50 percent for crude oil (60 percent for natural gas). A higher profit oil for the contractor was adopted, while all bonuses were eliminated.

Malaysia adopted the Petroleum Income Tax Act in 1967 which dealt specifically with the taxation of income from crude oil and gas production. The amount of tax collected in a particular year depends on the prices, production levels and expenses of the preceding year. The tax rate was initially set at 50 percent, but later reduced to 45 percent in 1976. Development tax is not charged under this Act. The petroleum income tax is levied on income in the upstream sector, while downstream income is taxed under the corporate income tax.

Chart 4.4 gives a graphical presentation of the importance of petroleum income tax as a share of tax revenue. The contribution of petroleum income tax started growing in importance in the late seventies to reach a peak in 1986 when its contribution to tax revenue amounted to 21 percent. With the adoption of the second generation production sharing contract scheme, the contribution of petroleum income tax declined markedly to 12 percent in 1987. The share later tapered off to 5 percent in 1995 as the result of the declining value of crude petroleum export in the early nineties.

3.2 Indirect Taxes

Indirect taxes consist of export duties, import duties, excise duties, sales tax, service tax and other indirect taxes. As shown in Table 4.18, revenue from total indirect taxes grew rapidly in the seventies, especially with the buoyant export prices during 1976-80. In the eighties, average annual growth of revenue from this source fell dramatically to only 0.9 percent during 1980-85 as a result of the collapse of commodity prices. After 1986, growth of indirect taxes was restored, averaging 7.8 percent per annum in 1986-90 and 10.3 percent per annum in 1991-95. In 1970, indirect taxes contributed close to two thirds of the total tax revenue. The contribution fell to 47 percent in 1995 as a result of the declining importance of export duties and import duties (Table 4.19 and Chart 4.5).

3.2.1 Export Duties

Until the mid-eighties, Malaysia was essentially a producer and exporter of primary commodities. Primary exports accounted for almost 80 percent of the total exports in 1970. Although the share had fallen over time, the contribution of primary exports was still high at 54 percent in 1988. By 1995, the contribution of primary exports had shrunk to 11 percent. There was less concentration in the export of four commodities (rubber, saw logs, crude palm oil and tin) over the years. The four commodities accounted for 56 percent of the total primary exports in 1995, compared with 96 percent in 1970.

Export duties in Malaysia are principally levied on primary commodities. These taxes are favoured by countries in the early stages of development because they are cheap to collect and easy to administer. Some arguments against export duties are: (a) they are regressive and fall disproportionately on the producers and smallholder agricultural producers (see Lipton, 1977), and (b) they distort the efficient allocation of domestic resources by causing resources to shift out of export activities into import activities or the production of non-tradable goods and services. Booth (1980: 57) found that export duties in Malaysia could only tap a small proportion of the increment in export earnings, and they are inequitable in the burden they impose on producers.

The rates on export duties are largely on *ad valorem* basis which vary across commodities and are progressive in relation to their export prices. The export duties of rubber and palm oil are collected when the market prices for exports exceed the notional cost of production. The export duties on crude palm oil and processed palm oil are based on their value published in the government *Gazette.* For instance, duty is charged on the export of palm oil when the price level exceed RM650 per tonne, which is estimated to be the cost of production. The export duty on petroleum was introduced since April 1980. Export duty on crude petroleum is based on the gazetted value and charged at 25 percent *ad valorem* (20 percent in the 1994 Budget). In addition to export

TABLE 4.20 STRUCTURE OF EXPORT DUTIES, 1989 AND 1993

(In RM '000)

	1989	*%*	*1993*	*%*
Rubber	58,223	*3.67*	0	*0.00*
Tin and Tin Ore	2,128	*0.13*	0	*0.00*
Bauxite	45	*0.00*	0	*0.00*
Iron Ore	36	*0.00*	0	*0.00*
Ilmenite	6,166	*0.39*	0	*0.00*
Zircon	2,607	*0.16*	0	*0.00*
Other Minerals	960	*0.06*	0	*0.00*
White Pepper	881	*0.06*	0	*0.00*
Black Pepper	1,872	*0.12*	0	*0.00*
Timber	544	*0.03*	106	*0.01*
Crude Palm Oil	1,650	*0.10*	5,435	*0.37*
Processed Palm Oil	12,416	*0.78*	1,237	*0.08*
Building Materials	315	*0.02*	290	*0.02*
Crude Petroleum	1,431,610	*90.14*	1,428,812	*97.61*
Food Items	516	*0.03*	74	*0.01*
Palm Kernel	2,415	*0.15*	1,002	*0.07*
Other Duties on Exports	65,735	*4.14*	26,837	*1.83*
Total	1,588,121	*100.00*	1,463,793	*100.00*

Source: Ministry of Finance, *Estimates of Malaysia's Federal Revenue, 1991* and *Federal Budget 1995* duties, rubber export is also levied research and replanting cess, while tin export is subject to research and development cess.

The changing composition of primary exports is reflected in the export duties collected. The tax revenue is highly cyclical, being determined by fluctuating world market prices. Export duties as a percentage of tax revenue peaked in 1974 (22 percent) as well as 1979-80 (20 percent), before declining throughout the eighties and into the nineties to reach 2 percent in 1995 (Table 4.19). The export duties for palm oil recorded negative growth rates during the mid-seventies, while the duties for rubber and tin started falling in the 1980s. The peaks corresponded with the buoyant prices of primary commodities (see Table 4.6).

In the 1991 Budget, the government abolished the export duties on rubber, pepper and all minerals. A comparison of the structure of export duties for 1989 and 1993 wouldhighlight the effect of this abolition on the revenue accrued from this source (see Table 4.20). Since 70 percent of rubber and all the pepper produced in the country are grown by smallholders, the abolition of the export duties was expected to help improve their income. As for tin, the revenue collected from export duty on tin has anyway been insignificant since 1985. The fall in the collection of export duties from the traditional commodities was only partially offset by petroleum export duty. But even then, the collection of petroleum export duty started to decline after 1985. With less number of goods subject to export duties, the amount of export duties collected has also fallen over the years and is largely derived from petroleum export.

3.2.2 Import Duties

Since the colonial period, import duties were imposed to raise revenue, and in some cases, to control the domestic supply of certain goods. In the 1960s, the strategy to promote import substitution had led to a series of tariff increases in order to protect domestic industry from foreign competition. The government had successively raised tariffs on motor vehicles, consumer durables, tobacco products and alcoholic liquor. The oil price hike in 1974 had pushed inflation into the double digits. To keep inflation down and reduce the price burden on the poor, some 'essential commodities', such as sugar, diesel oil, kerosene, wheat flour, condensed milk, fertilisers, and plywood were exempt from import duties (Ministry of Finance, *Economic Report 1974/75*: 35; Asher and Booth, 1983: 88). The revenue foregone was approximately RM162 million or 12 percent of the estimated total import and excise duties in 1974.

Import duties are levied on a wide range of imports into Malaysia. The rates generally vary from 0 to 100 percent, although CBU motorcars imports can be as high as 300 percent. Custom duty is mostly *ad valorem* although some specific taxes are charged on a number of commodities.[12] The majority of imports are taxed between 10 and 35 percent. An import surcharge of 2 percent is levied on raw materials and some machinery, while the rate of 5 percent is charged on other goods.

Malaysia has signed bilateral trade agreements with many countries[13] specifying the maximum rates of import duties and preference margins for particular products. For ASEAN, the minimum Margin of Preference (MOP) is 25 percent. Various exemptions are given when imports are used by government and public enterprises. In addition, import duty exemptions are used in accordance with the industrial incentives policies to promote certain types of investments and exports. The granting of tax exemption on raw materials and machinery for the manufacturing sector depends on whether the finished products are sold in the domestic market or exported. Imported raw materials and components can qualify for full exemptions for the manufacturers who produce finished products for export markets. A manufacturing company producing for domestic market can qualify for import duty exemption as well if it complies with the

[12] There generally are two main types of tariffs: (a) *ad valorem* duty which is levied as a fixed percentage of the value of the good; (b) specific duty which is levied as a fixed sum of money per physical unit of the good (Pass and Lowes, 1993).

[13] The countries that had signed trade agreements with Malaysia are Australia (1968), New Zealand (1961), United Arab Emirates (1962), South Korea (1962), Russia (1967), Bulgaria (1968), Rumania (1969), Yugoslavia (1969), Hungary (1970), Poland (1972), Czechoslovakia (1972), Indonesia (1973), Libya (1977), Turkey (1977), Bangladesh (1977), Democratic Republic of Korea (1979), German Democratic Republic (1980), Italy, Mali and ASEAN countries.

TABLE 4.21 STRUCTURE OF IMPORT DUTIES, 1989 AND 1993

(In RM '000)

	1989	*%*	*1993*	*%*
Petrol	614,362	*21.19*	1155294	*25.14*
Lubricants and Grease	6,087	*0.21*	23929	*0.52*
Fuel Oils	35,735	*1.23*	44658	*0.97*
Kerosene	3,945	*0.14*	4000	*0.09*
Aviation Fuel	1,240	*0.04*	1219	*0.03*
Liquefied Petroleum Gas	44,877	*1.55*	3224	*0.07*
Diesel	43,868	*1.51*	206456	*4.49*
Other Petroleum and Fuel Products	2,459	*0.08*	2988	*0.07*
CBU Cars	108,896	*3.76*	348636	*7.59*
CKD Cars	203,995	*7.04*	288320	*6.27*
Other Motor Vehicles	77,050	*2.66*	94060	*2.05*
Motor Spare Parts	101,020	*3.48*	143111	*3.11*
Liquor	73,572	*2.54*	104207	*2.27*
Malt Liquor	3,538	*0.12*	1758	*0.04*
Fresh Fruits	48,087	*1.66*	44964	*0.98*
Dried and Preserved Fruits	3,043	*0.10*	4558	*0.10*
Canned Food	14,805	*0.51*	17765	*0.39*
Animal Feeds	10,622	*0.37*	8125	*0.18*
Tobacco, Cigarettes and Cigars	192,917	*6.65*	189032	*4.11*
Textiles and Apparels	106,591	*3.68*	144085	*3.14*
Television	7,952	*0.27*	9744	*0.21*
Video Recorder	6,743	*0.23*	4216	*0.09*
Refrigerators	9,269	*0.32*	11589	*0.25*
Audio Electronic Appliances	15,822	*0.55*	34828	*0.76*
Other Household Equipment	23,295	*0.80*	19879	*0.43*
Musical Instruments	9,078	*0.31*	4634	*0.10*
Machines and Spare Parts	90,107	*3.11*	164302	*3.57*
Furniture	4,539	*0.16*	11272	*0.25*
Glass and Glassware	16,034	*0.55*	18967	*0.41*
Steel	42,938	*1.48*	88734	*1.93*
Ceramic	4,430	*0.15*	6960	*0.15*
Other Building Materials	10,970	*0.38*	15631	*0.34*
Lock and Key	2,291	*0.08*	4881	*0.11*
Chemical Detergents	2,867	*0.10*	2049	*0.04*
Fertilisers	11,187	*0.39*	6733	*0.15*
Resins and Plastic Materials	36,572	*1.26*	70870	*1.54*
Medicine	1,999	*0.07*	2565	*0.06*
Duties Collected from Passengers	14,970	*0.52*	12707	*0.28*
Other Import Duties	794,015	*27.39*	1274967	*27.74*
Surtax	97,133	*3.35*	5	*0.00*
Total Import Duties and Surtax	2,898,920	*100.00*	4,595,922	*100.00*

Source: Ministry of Finance, *Estimates of Malaysia's Federal Revenue for the Year 1991* and *Federal Budget 1995*.

equity condition of the New Economic Policy as stipulated in the manufacturing licence[14]. Exemptions will only be considered for raw materials and components that are not available locally.

During the last twenty five years, import duties have grown by almost elevenfold, from RM557 million in 1970 to RM6.0 billion 1995, and contribute between 3-4 percent of GDP to government revenue. The contribution of import duties to tax revenue has been fairly consistent since 1975 despite the reduction in import duties since the mid-1980s. In the 1986 Budget the import duty on certain equipment used by fisheries and agriculture was abolished, while import duty on a variety of raw materials were reduced to a uniform rate of 2 percent. The structure of imported duties for 1989 and 1993 is shown in Table 4.21. The largest items are petroleum products and motor vehicles.

In the 1989 Budget, tariff protection for infant industries was reviewed, while import duties for consumer products were reduced between 20-87 percent. In the 1990 Budget the import duties and excise duties of food items, inputs for the agriculture sector and household items were reduced to moderate price increases. The government abolished import duties on rubber, tin and pepper in the 1991 Budget in order to encourage the free flow of primary commodities into Malaysia. This measure was aimed at developing Malaysia into the region's main centre for processing and manufacturing of agro-based products and enhance the growth of the Kuala Lumpur Commodity Exchange. In the later budgets, the government continued to reduce or abolish import taxes for 600 items in the 1993 Budget, 500 items in the 1994 Budget, and over 26,000 items in the 1995 Budget.

3.2.3 Excise Duties

Excise duties are the oldest form of indirect taxes in Malaysia. They are levied on imports as well as locally manufactured goods. The tax base for excise duties Malaysia was extended in 1968, but this did not have a significant impact on revenue until an excise tax on motor vehicles was introduced in 1970. In 1982 budget the government abolished excises on some products, such as gas stoves, fans, electric irons, ovens, and

[14] This is in relation to equity participation, management and employment structure.

TABLE 4.22 EXCISE DUTY BY PRODUCTION TYPE, 1989-95

(In RM '000)

	1989	*%*	*1993*	*%*
Petrol & Petroleum Products	795,090	*41.15*	1,423,556	*38.34*
Motor Vehicles	661,261	*34.22*	1,326,367	*35.72*
Liquor	266,753	*13.80*	411,328	*11.08*
Cigarettes	154,300	*7.99*	476,079	*12.82*
Refrigerators	10,491	*0.54*	9,594	*0.26*
Carbonated Beverages	6,695	*0.35*	10,280	*0.28*
Air Conditioners	10,316	*0.53*	18,637	*0.50*
Tyres & Tubes	9,319	*0.48*	13,550	*0.36*
Television	6,155	*0.32*	11,385	*0.31*
Monosodium Glutamate	5,593	*0.29*	7,948	*0.21*
Batteries	3,318	*0.17*	3,744	*0.10*
Matches	1,822	*0.09*	0	*0.00*
Others	1,189	*0.06*	661	*0.02*
Total	1,932,302	*100.00*	3,713,129	*100.00*

Source: Ministry of Finance, *Estimates of Malaysia's Federal Revenue, 1991* and *Federal Budget 1995*

cement, as an anti-inflationary measure. The revenue impact of this was fairly small (Asher and Booth, 1983: 50-51).

Table 4.22 shows the structure of excise duty by production type. In 1993, excise duties account for 11.6 percent of total tax revenue. They are levied on petroleum products, liquor, cigarettes, tyres and tubes, flashlight batteries, soft drinks, motor vehicles, television sets, refrigerators, and air conditioners. The main contributors to revenue from excise in 1993 were fuel oil and petroleum products (38 percent), motorised vehicles (35 percent), locally manufactured cigarettes (13 percent), and locally produced liquor (11 percent). To discourage smoking and the consumption of liquor, the excise duties on cigarettes, beer and stout were increased in the 1991 and 1992 budgets.

Excisable products are traditionally selected for their high yield at low administrative costs. These are products with low price elasticities, such as necessities, and high income elasticity, in the case of luxury goods. Excise duties (Exemption) Order 1977 lists out the group of people and goods exempted from excise duties. Partial exemption of excise duty is also given for petroleum and petroleum products manufactured in Sabah and Sarawak. Taxis, hire-cars and buses are given full exemption. There is also no excise duty on exports.

3.2.4 Sales Tax

This tax was first introduced under the Sales Tax Act of 1972 as a means for raising revenue and closing the budget deficit. This act superseded the series of taxes introduced during 1964-67. First was the turnover tax of 0.5 percent on gross sales of all trades, businesses, and professions introduced in the 1965 budget. In the following year, this tax was replaced by a flat rate of 2 percent single stage levy on domestic sales of certain imports. This was repealed again and replaced by a two percent surtax on imports from 1 January 1967.

The current sales tax is an *ad valorem* single stage tax imposed at the import and manufacturing levels. The tax is levied on domestically manufactured goods, on imports and on a few selected servicesFor domestic goods, it is at the level of the manufacturer, while for imported goods the importer is charged the tax based on the value of cost-insurance-freight (CIF) plus import duties. A manufacturer is defined rather broadly under the Sales Tax Act to include one who converts by manual or mechanical means organic or inorganic materials into a new product by changing the size, shape, or nature of such materials and include the assembly of parts into a piece of machinery or other product, but does not include the installation of machinery or equipment for the purpose of construction. Three tax rates are applied: (a) the general rate is 10 percent, (b) a rate of 5 percent is imposed on certain non-essential foodstuff and building materials, and (c) cigarettes and liquor are taxed at 15 percent.

TABLE 4.23 SALES TAX COLLECTED ON LOCAL AND IMPORTED GOODS, 1985-89

(In RM '000)

	Domestic Goods	*Annual Increase (%)*	*Imported Goods*	*Annual Increase (%)*	*Total*	*Annual Increase (%)*
1985	767,344	*-2.5*	469,693	*-11.5*	1,237,037	*-6.2*
1986	629,107	*-18*	358,600	*-23.6*	987,707	*-20.2*
1987	721,546	*14.7*	369,064	*2.9*	1,090,610	*10.4*
1988	942,194	*30.6*	512,284	*38.8*	1,454,478	*33.4*
1989	1,252,245	*32.9*	659,350	*28.7*	1,911,595	*31.4*

Source: Royal Customs and Excise Department (1990), *Annual Report.*

One of the problem associated with the sales tax is the multiple taxation of raw materials, capital goods and other intermediate inputs. This cascading of taxes[15] would cause variations in the effective sales tax rate of goods and non-neutrality in business decisions. In addition, there is also the problem of tax pyramiding.[16] In an attempt to circumvent the problems of tax cascading and pyramiding of the manufacturer's sales tax, Malaysia adopted the 'ring system'. The sales tax system allows the licensed firms to purchase and import tax-free all the inputs, components, intermediate goods, and capital goods they require. Exporters are also allowed to purchase and import tax-free material inputs for their production process. Sales tax is levied only when an unlicensed firm purchases inputs from a licensed firm.

[15] Tax cascading can occur with both the sales tax as well as the service tax. The imposition of a tax at various stages of production or distribution process compounds the effects of multi-stage taxation of the same item on its final price.

[16] The pyramiding effect results from profit mark-ups by wholesalers and retailers that are based on the tax-inclusive prices charged by manufacturers. Tax pyramiding causes the consumer to pay higher prices than the amount of the sales tax collected by the government.

TABLE 4.24 SALES TAX ON DOMESTIC GOODS BY INDUSTRY

(In RM '000)

Industry	*1988*	*%*	*1989*	*%*
Confectionery	11,513	*1.22*	20,902	*1.67*
Spirit, malt & liquors	74,334	*7.89*	79,564	*6.35*
Aerated water	26,747	*2.84*	31,553	*2.52*
Tobacco, cigars & cigarettes	155,305	*16.48*	159,179	*12.71*
Textiles	12,517	*1.33*	14,018	*1.12*
Footwear	13,026	*1.38*	15,768	*1.26*
Garment making, other than tailoring	22,833	*2.42*	28,548	*2.28*
Furniture, other than wood prod.	22,889	*2.43*	27,987	*2.23*
Paper & paper products	39,067	*4.15*	43,575	*3.48*
Rubber products other than footwear	42,988	*4.56*	48,027	*3.84*
Paints, varnishes & lacquer	21,667	*2.30*	27,423	*2.19*
Soap washing & cleaning compound	18,949	*2.01*	22,817	*1.82*
Perfume, cosmetic and toiletries	10,800	*1.15*	12,574	*1.00*
Base metal	54,472	*5.78*	69,571	*5.56*
Jewellers & goldsmith wares	213	*0.02*	0	*0.00*
Motor vehicles	171,865	*18.24*	325,914	*26.03*
Machinery	12,263	*1.30*	13,820	*1.10*
Plastic goods	39,413	*4.18*	45,595	*3.64*
Electrical goods	70,365	*7.47*	91,712	*7.32*
Miscellaneous	120,967	*12.84*	173,697	*13.87*
Total	942,193	*100.00*	1,252,244	*100.00*

Source: Royal Customs and Excise Department (1990), *Annual Report*

Manufacturers whose sale value of taxable goods do not exceed RM100,000 per annum are exempted from sales tax to keep the tax administration manageable. To promote vertical equity tax and not overburden the poor households, the sales tax exempts primary commodities, basic foodstuffs, basic building materials, and certain agricultural implements and machinery. Luxury goods are subject to higher taxes. However, the net effect of the sales tax is not really progressive throughout the income scale. According to Salleh (1988), the distribution of sales tax burden of locally manufactured and imported goods is regressive for the lower income bracket but progressive at the upper income bracket. In addition, certain tourist and sports goods, books, newspapers and other reading materials and all exports are exempted from sales tax. Certain privileged persons, diplomats and government agencies are not required to pay the tax.

During the last twenty years, the contribution of sales tax to total tax revenue grew from 6 percent in 1975 to 11 percent in 1995. This is a modest growth considering the rapid expansion of consumption of 11 percent per annum during 1975-95. The government had taken steps to improve the sales tax and the service tax. In 1983, the sales tax rate was increased from 5 to 10 percent and tobacco and liquor products were taxed at 15 percent. The base of sales tax was expanded with the removal of a few exemptions in 1988. In the 1989 Budget, the sales tax was re-imposed on certain foodstuffs, building materials, semi-processed and non-essential goods. Table 4.23 shows the revenue collected from sales tax on local and imported goods, while Table 4.24 presents the structure of sales tax on domestic goods by industry for 1988 and 1989. Despite these adjustments, the narrow base and problems associated with the sales tax remain because the system is basically flawed.

3.2.5 Service Tax

This tax was introduced under the Service Tax Act, 1975. A service tax of 5 percent is imposed on certain goods and services provided in certain prescribed establishments. The goods are food, drinks and tobacco, while the main services include rooms for lodging, nightclubs, dance halls, cabarets, health centres and massage parlours. Generally, all large hotels and their restaurants are subject to the tax. A limited range of restaurants located outside hotels are also subjected to the tax provided their annual turnover exceed

TABLE 4.25 SERVICE TAX BY TYPES OF BUSINESS, 1988 AND 1989

(In RM '000)

	1988	*%*	*1989*	*%*
Hotel	39,668	*54.31*	50,931	*54.79*
Restaurant	19,040	*26.07*	23,769	*25.57*
Bar	729	*1.00*	675	*0.73*
Snack Bar	10	*0.01*	191	*0.21*
Coffee House	210	*0.29*	239	*0.26*
Night Club	2,862	*3.92*	2,989	*3.22*
Dance Hall	1,874	*2.57*	2,655	*2.86*
Cabaret	54	*0.07*	80	*0.09*
Health Centre	666	*0.91*	833	*0.90*
Massage Parlour	526	*0.72*	623	*0.67*
Private Club	1,494	*2.05*	1,619	*1.74*
Public House License	5,707	*7.81*	8,093	*8.71*
Beer House License	193	*0.26*	234	*0.25*
Miscellaneous	5	*0.01*	25	*0.03*
Total	73,038	*100.00*	92,956	*100.00*

***Source*:** Royal Customs and Excise Department, *Annual Report* 1990.

RM500,000. All places in possession of first class liquor licenses have also been brought within the ambit of this tax. However, the tax does not apply to hotels having less than 25 rooms, hostels for students or those maintained by religious institutions, as well as restaurants with less than RM500,000 annual turnover and located outside hotels. As shown in Table 4.25, about 80 percent of the service tax revenue for 1988 and 1989 were derived from hotels and restaurants.

The service tax has subsequently been widened in recent budgets. In the 1992 Budget, the tax covers professional and consultancy services provided at private hospitals and by legal, engineering, surveyor, architectural, accounting and other consultancy firms having an annual sales turnover of RM300,000 and above. In addition, services provided by advertising firms, insurance companies and motor vehicles service and repair centres, and forwarding agents are subject to service tax. In the 1994 Budget, the tax was further widened to include courier, parking bay, dental and veterinary services. Despite the extension of the service tax, its contribution to total tax revenue is small, at only 2 percent in 1995.

3.3 Weaknesses of Sales and Service Taxes

The sales tax as it stands provides tremendous scope for tax evasion. The task of administering the sales tax is complex and intractable both for the manufacturers as well as the Royal Customs and Excise Department that collects the taxes. Over 3,000 items and 100 categories of manufacturers are exempted from the tax. Since the tax is levied at the manufacturer/import level, manufacturers are encouraged to reduce tax liabilities through transfer pricing by shifting the tax base to the wholesale and retail arm. Taxing at the pre-retail level causes problems because of the difficulty in distinguishing final goods from intermediate goods. As an indicator of tax evasion among manufacturers, an increase of 100 percent in sales tax in 1983 from 5 percent to 10 percent had resulted in only an increase of 63 percent in tax revenue.

In addition, tax officials face problems assessing the amount of tax due from manufacturers that produce a wide variety of products, some of which are tax exempted and others may be taxed at different rates. There is no mechanism in the sales and service taxes to remove tax cascading from exports, which places Malaysian exports at a disadvantage. For Malaysian exports to be competitive at the international market, merchandise exports should not be taxed either explicitly or implicitly. The pyramiding and cascading of taxes affects prices of goods differently and in a manner unintended by policy makers, besides raising the cost of living.

3.3.1 Rationale For Adopting VAT

To overcome some of the weaknesses of the current sales and service taxes, the Malaysian Government is currently considering the adoption of a version of the value added tax (VAT). This intention was expressed in the 1989 Budget Speech and again in the 1993 Budget Speech. When Malaysia adopts the value added tax, it will join the ranks of over fifty-five industrial and developing countries that have implemented this system since the 1960s. According to Cnossen (1991: 72), VAT can generate revenues of around 0.4 percent of GDP for every percentage point of the rate, which might be useful in providing the government with an indirect tax handle to raise revenue. The advantage of VAT over the existing sales and service taxes is its neutrality. The tax does not interfere with production or trade, and does not distort the economic costs of doing business. Malaysian exports can be tax exempted and become more competitive internationally. It also reduces tax evasion with its self-policing feature of using a system of credits.

There are other advantages for Malaysia in adopting the VAT system. VAT will extend the tax base and generate more revenue to counteract the fall in the rates of many of the taxes. The removal of tax cascading and tax pyramiding is expected to improve the investment climate for local and foreign businesses, as well as free business from the burden of applying for tax exemptions from the Royal Customs and Excise Department. One area of concern is that the adoption of VAT may lead to increased price level. Narayanan (1991: 85) argues that the price level will rise if VAT brings in more revenue than sales tax, and if traders widen the profit margin to protect themselves against uncertainty. However, Tait (1990: 18) found that among 36 countries that adopted VAT, 22 countries had a negligible price effect, eight countries experienced a one-time price increase, and six countries experienced an increase in their inflation rates. Gillis, Shoup and Sicat (1990: 221) conclude that other factors may lead to inflation, but not VAT.

4. TAX BUOYANCY AND PROSPECTS FOR FUTURE REVENUE

Tax buoyancy is often used in tax literature as a method of relating future revenue possibilities in to past trends of tax revenue and GDP growth. The buoyancy of a tax depicts the relationship between percentage change in tax collection and percentage change in income. In other words, it shows the responsiveness of the yields of different tax instruments to income growth. A tax with buoyancy greater than one means that its revenue rises faster than income growth. A high degree of buoyancy or 'revenue productivity' is generally associated with a good tax system. While this approach of relating tax revenue with income growth can be rather simplistic, it does provide some useful summary statistics. A more sophisticated approach is to examine the prospects for future revenue growth with the general equilibrium model, an approach which we will use for tax simulations in Chapter 5.

The tax buoyancy coefficient is calculated as follows:

$$\log T_t = \beta_0 + \beta_1 \log Y_t + \varepsilon_t$$

where T_t is the tax revenue variable, Y_t is GDP or any other measure of income, and ε_t a random term. The parameter β_I represents the tax buoyancy coefficient. A variety of factors can affect changes in tax revenues, besides changes in income. They include discretionary changes in the tax rates or tax base, tax avoidance and evasion, changes in the efficiency of tax administration, and so on. These factors can be particularly important following a tax reform. Hence, the measure of tax buoyancy is used to measure changes in tax revenues not only as a response to income changes, but discretionary changes as well. In other words, the tax buoyancy indicator measures income elasticity after controlling for discretionary tax changes. The regression equation for estimating buoyancy with significant discretionary effect is as follows:

$$\log T_t = \beta_0 + \beta_1 \log Y_t + \beta_2 \text{DUM} + \beta_3 \text{DUM}^* y + \varepsilon_t$$

where T_t is the tax revenue, Y_t is GDP or any other income measure, DUM is a dummy variable, DUM*y is the interaction term, and ε_t is the random error term. The dummy variable represents a discretionary change that affects tax revenue at a particular point in time. A positive coefficient for the dummy term, β_2, means that there is an upward shift

TABLE 4.26 BUOYANCY OF DIRECT TAXES, 1970-95

Revenue (Ln T_t)	*Constant*	*Ln GDP*	*Ln T_{t-1}*	*DUM*	*DLGDP*	*Adj. R^2*	*D.W.*
Total Tax Revenue	-3.248	1.156		-0.303		0.992	1.992
t-ratio	(*-8.101*)	(*30.550*)		(*-5.106*)			
Direct Taxes	-5.592	1.307		-0.232		0.995	1.543
t-ratio	(*-10.182*)	(*25.306*)		(*-3.320*)			
Total Income Tax	-5.503	1.292		-0.234		0.995	1.349
t-ratio	(*-9.383*)	(*23.517*)		(*-3.352*)			
Company Tax	-3.686	1.028	0.048	-5.531	0.466	0.984	–
t-ratio	(*-5.351*)	(*6.645*)	(*0.356*)	(*-4.660*)	(*4.558*)		
Personal Income Tax	-6.054	1.209				0.984	1.871
t-ratio	(*-10.794*)	(*23.364*)					
Petroleum Tax[a]	-7.740	1.211	0.276	10.766	-0.989	0.933	–
t-ratio	(*-2.621*)	(*3.498*)	(*2 .215*)	(*2.304*)	(*-2.386*)		

Total Tax Revenue	Test β_1=1 : t stat = 5.255; F stat = 27.618; Wald chi-sq. = 27.618
Direct Taxes	Test β_1=1 : t stat = 9.584; F stat = 91.863; Wald chi-sq. = 91.863
Total Income Tax	Test β_1=1 : t stat = 9.069; F stat = 82.255; Wald chi-sq. = 82.256
Company Tax	Test β_1=1 : t stat = 0.185; F stat = 0.343; Wald chi-sq. = 0.034;Durbin h = 0.390
Personal Income Tax	Test β_1=1 : t stat = 5.306; F stat = 28.154; Wald chi-sq. = 28.154
Petroleum Tax	Test β_1=1 : t stat = 0.611; F stat = 0.374; Wald chi-sq. = 0.374; Durbin h=0.646

Revenue	*Long-Run Elasticity*
Company Tax	1.080
Petroleum Tax	1.672

Notes:
Dummy variable is DUM = 0 before 1987; DUM = 1 from 1987 and after.
Interaction term is DLGDP = DUMGDP
T-statistics are in brackets.

[a] 1974-95

TABLE 4.27 BUOYANCY OF INDIRECT TAXES, 1970-95

Revenue (Ln T_t)	*Constant*	*Ln GDP*	*Ln T_{t-1}*	*DUM*	*DLGDP*	*Adj. R^2*	*D.W.*
Indirect Taxes	-1.771	0.952				0.987	1.723
t-ratio	*(-2.533)*	*(14.921)*					
Export Taxes	1.614	-0.053	0.861			0.819	–
t-ratio	*(2.012)*	*(-0.487)*	*(6.975)*				
Import Taxes	-0.185	0.856		-1.162	0.015	0.991	1.690
t-ratio	*(-3.060)*	*(14.846)*		*(-2.728)*	*(2.644)*		
Excise Duties	-1.113	0.590	0.237	-5.311	0.467	0.988	–
t-ratio	*(-1.062)*	*(2.846)*	*(1.199)*	*(-3.900)*	*(3.955)*		
Sales Tax[a]	-7.702	1.316				0.987	1.818
t-ratio	*(-14.918)*	*(28.628)*					
Service Tax[b]	-15.026	1.501	0.534			0.952	–
t-ratio	*(-3.935)*	*(3.927)*	*(3.328)*				

Indirect Taxes	Test β_1=1 : t stat = -4.119; F stat = 16.973; Wald chi-sq. = 16.973
Export Taxes	Test β_1=1 : t stat = -9.573; F stat = 91.643; Wald chi-sq. = 91.64; Durbin h=0.058
Import Taxes	Test β_1=1 : t stat = -3.44; F stat = 11.83; Wald chi-sq. = 11.83
Excise Duties	Test β_1=1 : t stat = -1.976; F stat = 3.908; Wald chi-sq. = 3.908; Durbin h=0.567
Sales Tax	Test β_1=1 : t stat = 0.918; F stat = 0.844; Wald chi-sq. = 0.844
Service Tax	Test β_1=1 : t stat = 1.312; F stat = 1.721; Wald chi-sq. = 1.721; Durbin h= -0.08

Revenue	*Long-Run Elasticity*
Export Taxes	-0.381
Excise Duties	0.773
Service Tax	3.221

Notes: Dummy variable for import duties and excise duties is DUM = 0 before 1987; DUM = 1 from 1987 and after.
Dummy variable for export duties is DUM = 0 before 1980; DUM = 1 from 1980 and after.
Interaction term is DLGDP = DUM*GDP
T-statistics are in brackets

[a] 1976-95
[b] 1985-95

TABLE 4.28 FIRST DIFFERENCE ESTIMATES OF TAXES, 1970-95

Δ_1 *Ln* T_t	*Constant*	Δ_1 *Ln* GDP_t	*DUM*	*Adj.* R^2	*D.W.*
Company Tax	-0.058	1.493	0.041	0.595	2.718
t-ratio	(*-1.449*)	(*5.688*)	1.000		
Petroleum Tax	-0.211	4.410	-0.253	0.662	1.384
t-ratio	(*-1.527*)	(*5.236*)	(*-1.883*)		
Export Taxes	-0.305	3.191		0.660	1.308
t-ratio	(*-4.755*)	(*6.686*)			
Excise Duties	0.039	0.688		0.199	2.039
t-ratio	(0.961)	(*2.210*)			
Sales Tax[a]	-0.013	1.355		0.391	2.321
t-ratio	(*-0.272*)	(*3.405*)			
Service Tax[b]	-0.153	3.808		0.509	1.422
t-ratio	(*-1.134*)	(*3.052*)			

Note: Δ_1 is the first difference operator.
Dummy variable for import duties and excise duties is DUM = 0 before 1987; DUM = 1 from 1987 and after. Dummy variable for export duties is DUM = 0 before 1980; DUM = 1 from 1980 and after.
T-statistics are in brackets
[a] 1976-95
[b] 1985-95

in the tax yield. In graphical terms, this is a shift in the intercept. On the other hand, a positive coefficient for the interaction term, β_3, implies a faster growth of tax yield after the introduction of a discretionary tax change. This is shown by a steeper gradient in the trend line.

For our Malaysian tax buoyancy estimations, we use selected tax revenue and GDP data for 1970-95 derived from the *Economic Report*. In the regressions, we introduce a dummy variable to account for discretionary tax policy changes that took effect in 1987 and after. In Table 4.26 we present buoyancy estimates for the period 1970-95 for direct taxes, while the buoyancy estimates for indirect taxes are shown in Table 4.27. The regression estimates are evaluated at the 5 percent level of significance.

The ordinary least square (OLS) method was used for the first round estimations of tax buoyancy. The OLS estimates confirm the problem of positive autocorrelation for

The ordinary least square (OLS) method was used for the first round estimations of tax buoyancy. The OLS estimates confirm the problem of positive autocorrelation for many of the regression equations, as indicated by their Durbin-Watson *d* statistics falling below the lower critical limit 1.302 at 5 percent level of significance.[17] To correct for autocorrelation, we used two approaches: (a) the Cochrane-Orcutt iterative method with convergence at 0.001, and (b) auto regressive lagged dependent variable approach. This process brought an improvement to the Durbin-Watson statistics for all the estimations using the Cochrane-Orcutt method, although some of the regression models had DW statistics falling within the region of indecision. For the taxes modelled on the auto regressive approach, we have also estimated the coefficients using the first difference approach and presented the Durbin h statistics, as shown in Table 4.28.

In our buoyancy estimations for direct income taxes, the tax revenue for any particular year is regressed against the GDP figures for the previous year in order to take into account Malaysia's prior-year assessment system. In other words, current year tax collection is based on last year's income assessment. In the case of indirect taxes, tax revenues are regressed against the GDP figures of corresponding years. The estimation used data from 1970-95, except for those taxes with shorter data series.

4.1 Tax Buoyancy Estimates

The results of the tax buoyancy estimations are shown in Table 4.26 and Table 4.27. The buoyancy coefficient for total tax revenue is 1.1, which means that the increase in tax revenue is a little greater in proportionate terms than the increase in income. Direct taxes are more buoyant than indirect taxes, a factor which accounts for the growing share of direct taxes in government revenue. After controlling for discretionary tax changes with the dummy variable, an increase in GDP by 1 percent would be accompanied with a corresponding increase of 1.3 percent for direct taxes and 0.9 percent for indirect taxes.

Among the components of direct taxes, personal income tax and petroleum tax have buoyancy coefficients of 1.2, while corporate tax has a unitary buoyancy

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[17] In the presence of autocorrelation, the OLS estimators remain unbiased and consistent, but they are no longer efficient. This means that the usual standard error, t and F tests of significance are not dependable.

coefficient. However, the test for the hypothesis $\beta_1 = 1$ shows that the buoyancy for petroleum and corporate taxes are no different from one. The absence of a dummy variable in the personal income tax model suggests that the revisions in the marginal personal income tax rates during the late eighties and early nineties have had negligible effect on the overall revenue productivity of this tax. The relatively low buoyancy of company tax may come as a surprise in view of Malaysia's rapidly growing economy and corporate sector. This could only imply that the wide range of tax exemption and incentives for the manufacturing sector had a more important role in dampening tax revenue expansion than was generally realised.

Table 4.27 shows that the buoyancy coefficient for indirect taxes is less than one. In other words, if the trend continues into the future, indirect taxes will not be very productive in revenue generation, unlike direct taxes. An examination of the component taxes reveals why this is the case. The buoyancy coefficient of export tax is practically zero, as shown by the insignificant coefficient for LNGDP at the 5 percent level. This comes as no surprise since export tax revenue for 1986-95 were fluctuating around the 1976-79 levels. Both import tax and excise duties have buoyancy coefficients of less than unitary. Among the indirect taxes, only the sales tax and service tax, which underwent expansion in their tax bases, had buoyancy coefficients of 1.3 and 1.5, respectively. The regression shows that service tax has a relatively high long-run elasticity of 3.2, but the period is too short for it to be really meaningful. Since sales and service taxes contribute slightly over a quarter of the indirect tax revenue, their higher buoyancy coefficients are not large enough to influence the low buoyancy for indirect taxes.

4.2 Issues on Tax Reform

Despite their limitations and the caveats on using them as guidance for policy,[18] tax buoyancy comparisons can be revealing in a number of ways. First, they provide some idea about the tax revenue trajectories. In raising revenue, the government could either focus on the taxes that are more responsive to GDP growth or, alternatively,

[18] Buoyancy estimates are based on past behaviour. They would not necessarily be good indicators of future revenue if the tax rates and structure are modified.

examine the areas of weakness in the tax structure. The latter would imply taking steps to reform the tax structure.

Second, in some of the regressions, the introduction of dummy variables helps to explain the role of discretionary tax changes that influence the revenue trend of revenue collected from these taxes since 1987, which are related to several tax reforms adopted in Malaysia. The corporate income rate was reduced in stages starting from 1986 as a means to stimulate investment and keep abreast with the corporate tax regimes of neighbouring countries. With the adoption of the Promotion of Investment Act (PIA) 1986, investment incentives and tax allowances for the manufacturing sector were expanded. For the petroleum industry, the Second Generation Production Sharing Contracts were adopted to provide more favourable terms and greater incentives to the contractor. The government also started to reduce gradually excise and import duties as a means of keeping consumer prices down and relieving the tax burden on the poor. Among one of the most comprehensive and influential non-governmental proposals for tax reform in Malaysia are contained in a report entitled, 'A Tax Reform Package for Malaysia' (MIER, 1988). This report presents the recommendations of the Colloquium on Tax Reform organised by the Malaysian Institute of Economic Research, which was attended by representatives from professional associations and business organisations, tax consultants, consumer groups, trade unions and academicians. Many of the proposals from the colloquium have been adopted by the Malaysian government.

Third, the estimates show that the petroleum buoyancy coefficient is slightly above unitary. Petroleum has provided the tax base for the eighties and early nineties. Since the tax revenue derived from petroleum is determined by fluctuating world oil prices as well as production quotas laid out in the National Depletion Policy, much less reliance should be placed on this natural resource sector to provide the impetus for public revenue growth, at least not on the scale that it had demonstrated in the past. Therefore, one of the themes for tax reform in Malaysia is the distribution of the tax burden, which increasingly have to be shouldered by income and consumption taxes.

Fourth, the buoyancy coefficient for personal income tax shows that it is fairly productive in revenue. Although Malaysia seems to perform favourably in comparison with its neighbours in mobilising income tax revenue, its performance is still lower than the OECD countries. An avenue to increase personal income tax revenue is establishing a modern and efficient tax administration that increases the tax base through more effective assessment and collection mechanisms.

Fifth, the performance of corporate taxation, as reflected by the unitary buoyancy coefficient, is not in keeping with the rapid expansion of the corporate sector. As an indication of the dynamic corporate sector, private capital expenditure rose from RM1,720 in 1988 to an estimated RM10,162 in 1994 (Ministry of Finance, 1994), recording an average annual growth of 34 percent. Although corporate tax contributed a growing share of the tax revenue, this relatively lacklustre performance of corporate tax can be traced to the income tax revenue loss from the numerous business incentives to attract foreign direct investments.

Finally, it highlights the fact that direct taxes are more productive in revenue generation than indirect taxes. It does appear that in a tax reform, much more attention should be given to redress the weaknesses of indirect taxes. The decline in trade taxes in Malaysia is dictated by policy and is consistent with the trend shown in Singapore, Thailand and Indonesia. Relative to the tax structures of Singapore, Indonesia and Thailand discussed earlier in the chapter, Malaysia recorded a sharp decline in the share of goods and services tax revenue despite the dynamism in business activities and private consumption. In view of these patterns, we propose that the scope for increasing the productivity of indirect taxes is to improve the current sales and service taxes by way of adopting the value added tax (VAT), which would increase revenue and raise the efficiency and equity of the tax system.

We take up some of these issues in the next chapter. By using the computable general equilibrium model, we examine the macroeconomic effects of raising revenue from personal income tax and corporate tax, compared to using the other indirect taxes to raise the same amount of revenue. In addition, we measure the macroeconomic impact of adopting VAT both as a revenue-neutral tax reform to replace the current sales and service taxes, as well as a revenue-enhancing measure.

5. CONCLUSION

During the last 25 years, the structure of the Malaysian tax system has changed quite dramatically. As shown by the tax buoyancy estimates, the tax reforms adopted after 1986 have had an impact on the revenue trends for some of the taxes. Although indirect taxes contributed 65 percent to government tax revenue at the start of the seventies, by 1982 it was overtaken by direct taxes, whose contribution to tax revenue recorded an increase of 18 percentage points during 1970-95. The low tax buoyancy coefficient for indirect taxes suggests that attention should be given to improve the tax base for this group of taxes. Since 1980, export duties rapidly dwindled, from a contribution of 20 percent to tax revenue to a mere 2 percent in 1995 following the abolition of duties on primary exports. Duties on many of the imports have also been reduced or removed. After declining by 10 percentage points from 1970, the contribution of import tax to government revenue since 1975 has been fairly constant.

The current sales tax is fundamentally problematic. It is complex, expensive to administer, faces the problem of tax cascading and tax pyramiding, and offers a wide scope for tax evasion. The adoption of VAT to replace the sales and services taxes will be able to redress many of the current weaknesses of these two taxes. In addition, VAT will modernise the tax system, broaden the tax base, and provide the government with an indirect tax handle to raise revenue with more fiscal neutrality and less economic distortions.

The main components for direct taxes are personal income tax, corporate tax, and petroleum income tax. Since 1984, Malaysia's personal income tax base have been expanding. Compared with neighbouring countries, Malaysian income tax payers face the highest marginal tax rates and arrive earlier at the highest tax bracket. The progressivity index shows that personal income tax has become more progressive for households in the middle income categories, but remains unchanged for those in the higher income categories. In terms of horizontal equity, only 18 percent of the employed in 1990 paid income tax and they were predominantly salaried employees and civil servants. To increase income tax yields, more effort should be made to reach the 'hard-to-tax' group of self employed and improve tax administration, rather than increasing income tax rates.

The taxes on the corporate sector were reduced in phases from a high level of 50 percent in 1985 to 30 percent in 1995. When coupled with deductions and exemptions from industrial incentives and tax holidays, Malaysia's marginal effective tax rate for the corporate sector becomes very much lower than the statutory level of corporate marginal tax rate. In addition, the buoyancy estimate for corporate tax shows that the tax yield of this sector is rather disappointing despite its rapid growth. There is potential for reducing or removing of some of the incentives to make the tax system more efficient and less distortionary.

At the height of buoyant oil prices, petroleum taxes accounted for about one-third of income tax revenue, two-fifths of excise duties, one-sixth of import duties, and over four-fifths of export duties. Government revenue became overly dependent on an income source faced with sharp price fluctuations. However, with the decline in oil prices and the adoption of the Second Generation Production Sharing Contracts, the contribution of petroleum taxes to tax revenue declined, making it necessary for the government to expand the tax base.

The tax buoyancy estimates highlight various tax revenue trajectories and the role of discretionary tax changes in influencing tax revenue trends. One area of tax reform is the distribution of the tax burden from petroleum taxes to income and consumption taxes. Personal income tax is fairly productive in revenue, but there is scope for increasing the tax base by establishing a modern and efficient tax administration. The performance of corporate tax is relatively lacklustre as a result of revenue loss from the numerous industrial incentives to attract foreign investments. The tax buoyancy estimates point towards the need to redress the weaknesses of indirect taxes. The reform of the sales and service taxes through the adoption of VAT merits serious consideration. In the next chapter, we will explore the macro economic effects of raising revenue from each major category of taxes as well as the adoption of VAT in the place of sales and service taxes.

Chapter 5

TAX REFORM SIMULATIONS

1 INTRODUCTION

In Chapter 4, we examined how the structure of Malaysian taxes has changed since 1970. Beyond looking at structural changes, it would be useful to examine the effect of tax changes on various aspects of the macro economy. This chapter applies a micro-macro applied general equilibrium model for Malaysia to examine the counterfactual effects of tax reforms.

One of the most difficult task of public economics is identifying the true effects and incidence of a tax or a public project (Atkinson and Stiglitz, 1980: 160). Taxes have wide ranging effects and implications on the macro economy and households, and the one who effectively pays a tax is not necessarily the person upon whom the tax is levied. An increase in the income tax rate reduces disposable income and, correspondingly, consumption. A tax levied on a particular good affects the profits of the producer, the incomes derived from supplying the factors of production, the demand by consumers, as well as the relative demand for and prices of labour and capital. A tax is also related to the other variables in the fiscal policy package. Typically, when the government chooses to raise one tax, this is usually accompanied by some other measures such as decreasing another tax, increasing public expenditure or adjusting public debt.

In view of the complexity of tax policy evaluation, the traditional way of using the partial equilibrium approach, which relies on *ceteris paribus* assumptions, has its limitations. A general equilibrium approach allows one to assess the interactions among different sectors and agents, thereby enabling a more comprehensive evaluation of policy options. The most significant step in applying a general equilibrium approach in tax analysis was fostered by the pioneering work of Harberger (1959, 1962, 1964). One decade later, a fully disaggregated computable general equilibrium (CGE) model[1] was put into operation by Shoven and Whalley (1972) who evaluated the effects of differential taxation of income from capital in the United States. The breakthrough in computing the equilibria for disaggregated CGE models was made possible by Scarf's algorithm (1967, 1973) which was refined by Olin Merril (1972).

Alongside CGE models that were used for developed countries to examine efficiency questions in neo-classical welfare analysis, there was another strand of work which focused on structural issues in developing countries. The neo-classical CGE model has limited application in developing countries because the simplifications are considered too confining for applied work (Robinson, 1989: 912). The earliest of CGE models for developing countries were the Adelman-Robinson (1978) model of South Korea and Taylor-Lysy (1980) model of Brazil. These general equilibrium models examined structural issues and the impact of alternative policy choices on poverty and income distribution.

There are over 200 books and journal articles on multisectoral applied general equilibrium model listed in the EconLit data base which shows that the literature is large and expanding. CGE modelling techniques have been used in a variety of developing countries such as India, Brazil, Korea, Kenya, Cameroon, Mexico, Yugoslavia, Turkey, Malaysia, Egypt, Indonesia and many other developing countries.[2] The popularity of the CGE approach is hardly surprising given its advantages over other methods such the partial equilibrium analysis, the input-output model and the linear programming models used in earlier analyses. As Robinson (1989: 906) observes, all linear input-output and social accounting matrix-based models are limited by their assumptions about fixed coefficients and cost prices. Unlike CGE models, they would not capture price adjustments, substitution possibilities in both production and demand, as well as supply and demand interactions.

[1] It is sometimes referred to as the Applied General Equilibrium (AGE) model.

[2] See de Janvry and Sadoulet (1985) for a survey of macro structuralist CGE models for India, Peru, Mexico, Egypt, Korea, and Sri Lanka. In Bourguignon, De Melo and Suwa (1991), CGE models are used to draw lessons from the OECD Project of adjustment policies on the distribution of income in Chile, Côte d'Ivoire, Ecuador, Malaysia, Morocco, and Indonesia.

The first comprehensive examination of the Malaysian tax system using an applied general equilibrium approach was undertaken by Bardai (1993). He drew data from various sources, such as the Malaysian Input Output Model 1983, and adjusted them to reflect the Malaysian economic structure in 1988. He first examined the effect of raising each category of taxes by one percent on tax revenue generation, as well as on market prices, real income and tax burden. Using the lump-sum tax as a yardstick, he also examined the incidence of taxes on firms and households. This approach was extended to examine the possible effects of adopting value added tax for Malaysia and reducing its corporate tax rate by 10 percent.

In this chapter, we seek to examine changes in the Malaysian tax system within a dynamic setting. A tax increase has far reaching effects on household disposable income, consumption, savings, aggregate prices, real wages, and GDP aggregates. It influences production, consumption, allocation of resources, as well as international trade. The effects are not only relevant to the time when the tax change is introduced but have also intertemporal implications. While Bardai's insightful study examines the effects of a marginal revision in tax rates in terms of revenue generation, efficiency and incidence on firms and households for 1988, this chapter looks at the effects of a significant revision in tax rates on a set of macroeconomic variables within a dynamic setting for the 1990s.

To evaluate reforms in the Malaysian tax system, we use the micro-macro general equilibrium model developed by Demery, Harrigan and McGregor (1992) for Malaysia. This model incorporates a blend of micro and macro elements which makes it suitable for analysing a wide range of economic issues. Unlike the genre of CGE models on taxation and international trade surveyed in Shoven and Whalley (1984), this model is designed as a multipurpose model that could be used to examine a wide range of economic issues, including providing analytical insights into the Malaysian tax policy.

In the next section, we provide an overview of CGE models that were developed and used for policy analysis in the developed and developing countries. Next we consider the economic models of Malaysia, including the development of the Malaysian Micro-Macro Model (M^4) that we use for tax reform simulations. In Sections 4 and 5, we describe the model structure as well as explain our data assumptions and model calibration. We then discuss the main results of ten tax reform simulations before finally considering some of the policy issues in the conclusion.

2 OVERVIEW OF CGE MODELS

Before the advent of CGE models, multisectoral economy-wide analysis was performed using the linear input-output model in the 1950s. The input-output model emanated from the pioneering work of W. Leontief who incorporated intermediate goods as part of the accounting system that allowed analysis of both the structure of gross production and interindustry linkages. A decade later, the linear programming (LP) models gained wide acceptance in the 1960s.[3] In the LP models, the analyst is able to introduce choice, constraints and optimisation into policy models which could be solved by computer. Dynamic input-output models[4] continue to be used today in development planning. The extended input-output model based on a Social Accounting Matrix (SAM)[5] came into vogue for development planning in the 1970s. The SAM provides an accounting framework for income and expenditure for each actor in the model and furnishes a consistent data framework for more complex models, such as CGE models.

One important feature of CGE models is that both quantities and relative prices are determined endogenously within the models, unlike input-output and planning models used for development planning purposes. CGE models can find numerical solutions for market clearing prices on all product and factor markets and tend to focus on the real side of the economy. According to Bergman (1990: 4), CGE models are generally aimed at clarifying equilibrium resource allocation patterns and the mechanisms by which policy measures affect the economy. They are less well adapted to examining business cycles phenomena or forecasting the exact outcome of specific government interventions.

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3 For a useful discussion on linear models, such as the input output analysis and linear programming models, see Robinson (1989) and Dervis, De Melo and Robinson (1982). More details on LP models can be obtained from Taylor (1975).

4 The dynamic I-O model links changes in investment by sector of destination, which is treated as an endogenous variable, to changes in sectoral output and demands for investment goods by sector of origin. The model has also been extended in many ways in applied work, such as taking into account macro constraints in a non-linear framework. Clark (1975) provides a survey of the extended I-O models that were applied to developing countries.

5 More in-depth discussion on the SAM can be obtained from Pyatt and Round, eds. (1985), and Ginsburgh and Robinson (1984).

The CGE model has its roots in the Walrasian general-equilibrium structure. It is converted into an applied analogue where an explicit numerical solution is computed from a model based on the parameters, exogenous variables, and equations which describe the economy. The model simulates the interaction of various economic actors across markets and assumes optimising behaviour on the part of these actors. The framework requires complete specification of the demand and supply sides of all markets which clear in equilibrium. The number of consumers are specified in the model. Each consumer has an initial endowment and a set of preferences, and is assumed to maximise his or her utility. The summation of each consumer's demands constitute market demands which depend on prices, are non-negative, continuous, and homogeneous of degree zero. In production, technology is associated with either constant or non-increasing returns to scale and producers are assumed to maximise profits.

In his pioneering work on CGE modelling, Johansen (1960) uses the multisectoral growth model to examine the sectoral aspects of economic growth in Norway. The model assumes a closed economy, and relative product and factor prices are determined by domestic conditions in the model. Foreign trade, public consumption and net investment, as well as aggregate supply of capital and labour and the rate of technical change are exogenously determined. Hence, Johansen treats household consumption as the only truly endogenous final demand component in the model. The interindustry linkages are in accordance with Leontief input-output model, while value-added deliveries are determined using Cobb-Douglas production functions which allow for input substitution possibilities at the sectoral level. The multisectoral growth model shares a common feature with other CGE models in that the household demand functions are derived on the assumption of utility maximisation under a budget constraint.

There are four essential ingredients in the specification of general equilibrium models, namely, the endowments of consumers, their preferences, the production technology, and the conditions of equilibrium (Shoven, 1983). Without going into details, it is useful to consider a stylised version of the CGE model in the Harberger–Scarf–Shoven–Whalley tradition. The exposition is based on the simplified model used by Shoven and Whalley (1984). In this model, there are two final goods (manufacturing and non-manufacturing), two factors of production (capital and labour), and two classes of consumers who have initial endowments of factors but no initial endowments of goods. The production function is characterised by constant returns to scale and constant elasticity of substitution (CES). Consumer demand function is generated by maximising the CES utility function subject to its budget constraint.

The production functions are given by

$$Q_i = \phi_i \left[\partial_i L_i^{\frac{(\sigma_i - 1)}{\sigma_i}} + (1 - \partial_i) K_i^{\frac{(\sigma_i - 1)}{\sigma_i}} \right]^{\frac{\sigma_i}{(\sigma_i - 1)}} \quad , \ i = 1, 2 \tag{1}$$

where Q_i is the output of the i^{th} industry, ϕ_i is the scale or units parameter, δ_i is the distribution parameter, K_i and L_i are the capital and labour factor inputs, and σ_i is the elasticity of factor substitution. It should be noted that most Harberger–Scarf–Shoven–Whalley CGE models adopt the CES specification. With the CES specification of the production functions, there are only three parameters to the factor demand functions: the scale factor, the distribution parameter, and the elasticity of factor substitution. After determining the value of one of these parameters from extraneous information, it is possible to identify the two other parameters based on one single observation on equilibrium prices and quantities. Hence, these models typically adopt *a priori* restrictive assumptions about factor substitution possibilities.

The factor demand functions derived from cost minimisation by differentiating the production function (1) with respect to the factor prices P_L and P_K, the per-unit cost of labour and capital for the industry. The demand functions for labour and capital are:

$$L_i = \phi_i^{-1} Q_i \left[\partial_i + (1 - \partial_i) \left[\frac{\partial_i P_K}{(1 - \partial_i) P_L} \right]^{(1-\sigma_i)} \right]^{\frac{\sigma_i}{(1-\sigma_i)}} \tag{2}$$

and ,

$$K_i = \phi_i^{-1} Q_i \left[\partial_i \left[\frac{(1 - \partial_i) P_L}{\partial_i P_K} \right]^{(1-\sigma_i)} + (1 - \partial_i) \right]^{\frac{\sigma_i}{(1-\sigma_i)}} \tag{3}$$

The factor prices are assumed to be equal across sectors.

For consumers, their utility is given by the CES utility functions

$$U^c = \left[(\alpha_1^c)^{\frac{1}{\sigma_c}} (X_1^c)^{\frac{\sigma_c - 1}{\sigma_c}} + (\alpha_2^c)^{\frac{1}{\sigma_c}} (X_2^c)^{\frac{\sigma_c - 1}{\sigma_c}} \right]^{\frac{\sigma_c}{\sigma_c - 1}} \tag{4}$$

where X_i^c is the quantity of good i demanded by the c^{th} consumer, α_i^c are share parameters, and σ_c is the substitution elasticity in consumer c's utility function. The consumer c's budget constraint is

$$P_1 X_1^c + P_2 X_2^c \leq P_L W_L^c + P_K W_K^c = I^c \tag{5}$$

where P_1 and P_2 are the consumer prices for the two output commodities, W_L^c and W_K^c are consumer c's endowment of labour and capital, and I^c is the income of consumer c. If consumers maximise their utility functions (4) subject to the budget constraint that expenditures do not exceed the income derived from the sale of endowments which they possess, the demand functions are

$$X_i^c = \frac{\alpha_i^c I^c}{P_i^{\sigma_c} (\alpha_1^c P_1^{(1-\sigma_c)} + \alpha_2^c P_2^{(1-\sigma_c)})} \quad , \quad i = 1, 2; c = 1, 2 \tag{6}$$

In this model, the values of ten parameters relating to the production and utility functions need to be specified. The six production function parameters affecting the supply of the two products are ϕ_i, δ_i, and σ_i for i = 1, 2, and the four utility function parameters determining the demand for the two products by each of the two consumers are α_1^1, α_1^2, σ_1 and σ_2. There is also the need to specify the endowment of labour (W_L) and capital (W_K) for the two consumers.

The equilibrium conditions in the model are given by equating market demand with market supply for all inputs and outputs, and zero profits in each industry. From (2) and (3), the equality of demand and supply for factors are given by

$$K_1(P_L, P_K, Q_1) + K_2(P_L, P_K, Q_2) = \overline{K} \tag{7}$$

$$L_1(P_L, P_K, Q_1) + L_2(P_L, P_K, Q_2) = \overline{L} \tag{8}$$

Maximising the CES utility function in equation (4) subject to consumer budget constraints and given Q_1 and Q_2 from equation (1), the equality of the demand and supply for goods are as follows

$$X_1^{\,1}(P_1, P_2, P_L, P_K) + X_1^{\,2}(P_1, P_2, P_L, P_K) = Q_1 \qquad (9)$$

$$X_2^{\,1}(P_1, P_2, P_L, P_K) + X_2^{\,2}(P_1, P_2, P_L, P_K) = Q_2 \qquad (10)$$

The zero profit conditions in both industries are given by

$$P_K K_1(P_L, P_K, Q_1) + P_L L_1(P_L, P_K, Q_1) = P_1 Q_1 \qquad (11)$$

$$P_K K_2(P_L, P_K, Q_2) + P_L L_2(P_L, P_K, Q_2) = P_2 Q_2 \qquad (12)$$

According to Walras' Law, if the zero profit condition in equation (11) is fulfilled, then the profit in equation (12) must necessarily be zero. The equilibrium of the model is given by the solution of equations (7)–(12) at prices P_L, P_K, P_1, P_2 . Since the prices of all supply and demand are homogeneous of degree zero, relative prices can be determined. The model adopts the condition that the sum of product and factor prices should add up to unity in order to normalise the level of prices.

The general equilibrium model above can be adapted for tax policy evaluation. The difficulty of incorporating taxes in the model is the interdependence between tax revenues and demand and supply. Tax revenues depend on the amount of demand, production, and factors employed. Demand, on the other hand, is a function of tax revenue which provide income to some agents in the economy. The approach used by Shoven and Whalley (1973) is not only to solve for equilibrium prices but also for equilibrium tax revenues. In the simple case where all government revenues are redistributed to consumers, the equilibrium condition is determined by equating the transfer payments made to consumers by government from the taxes collected, thereby imposing a balanced budget.

In pioneering the application of the general equilibrium model, Harberger (1962, 1966) introduced a general equilibrium model to examine the inter-industry distortion from corporate income tax. He had two industrial sectors in his model. The non-corporate sector included agriculture, housing, and crude oil and gas, while the other sectors fell into his corporate sector. The model assumed perfect competition and each sector produced a single output using homogeneous, perfectly mobile labour and capital which were fixed in supply in the aggregate. The model was simulated under a variety of assumptions on the elasticity of substitution in each sector. On the basis of the calculations, Harberger (1962: 234-5) concluded that capital bore close to 100 percent of the tax burden. In addition, he estimated that the dead-weight cost of corporate taxation in the USA between 1953 and 1959 to be between 2.4 and 7.0 percent of corporate tax revenues. About one decade later, Shoven and Whalley (1972, 1973) and Shoven (1976) used the Scarf algorithm to solve disaggregated versions of the Harberger model. Shoven (1976) corrected for the conceptual errors in Harberger's model and re-estimated the efficiency cost which was found to be between 6 percent and 15 percent of the revenue generated.

A useful comparison of methodologies in empirical general equilibrium models of taxation that had built on Harberger's model is provided in Fullerton, Henderson, and Shoven (1984).[6] These models include large, general-purpose models for different countries and designed to study a variety of taxes, transfers, and subsidies, as well as corporate income tax. In examining the economic efficiency impact of a tax reform on the U.S. economy, Ballard, Shoven and Whalley (1985) found that the marginal welfare costs of the existing taxes range from 17 to 56 percent of the tax collected. They argued that a modest reduction in tax rates would give rise to significant welfare gains. Fullerton, Ballard, Shoven and Whalley (1985) estimated the effect of integrating corporate taxation with personal taxation in the U.S. which was found to be beneficial. In his study of the 1973 U.K. tax reform, Whalley (1973) found that the distributional effect of the reform is small.

As Bergman (1990: 4-5) notes, there are many varieties of CGE models within the broad modelling framework. Some are single-country models intended for analysis of resource allocation and income distribution issues. Others are multicountry models which examine issues from a regional or global perspective. CGE models can be large multipurpose models, or specifically designed and used to address a particular problem. They can also differ in their level of disaggregation. Some provide elaborate treatment to

[6] The models used in the comparison are: Piggott-Whalley (1976, 1982), Fullerton-Henderson-Shoven-Whalley (1978, 1983), Ballentine-Thirsk (1979), Keller (1980), Serra-Puche (1979), Slemrod (1980, 1983), Fullerton-Gordon (1983) and Auerbach-Kotlikoff (1983).

the issues of production and technical change, while others focus on a disaggregated household sector or give detailed treatment on tax and transfer system.

Another branch of modelling work is the application of CGE models for developing countries.[7] These models which were initiated under the auspices of the World Bank in the early 1970s. Although Johansen's multisectoral model of Norway formed the basis of these work, it was felt that the simplifications of neo-classical CGE models, which include Johansen's model, were too confining and have limited application in developing countries. The earliest CGE models of developing countries were the Adelman-Robinson model of South Korea and the Taylor-Lysy model of Brazil. Both were designed to examine the impact of policy alternatives on poverty and income distribution. However, the literature on CGE models of developing countries fell into two categories.

One area of work is the 'neo-classical structuralists' CGE models which started from the World Bank studies on structural adjustment issues in the medium term. An early example of these studies is the modelling work of Dervis, de Melo, and Robinson (1982) which were based on neo-classical real trade theory and had strong roots in Walrasian general equilibrium theory. Although these models incorporate some adjustment rigidities, such as import rationing and rent seeking, they do not include macro variables such as interest rates or inflation. In their book *Income Distribution Policy in Developing Countries: A Case Study of Korea*, Irma Adelman and Sherman Robinson (1978) use the CGE model to examine income distribution policy within a reformist setting in the short to medium run. There are 29 producing sectors and in each sector are four firm size categories. There are also six labour skill categories and 15 household types. The modelling approach incorporates all the mechanisms through which the distribution of income would be affected within a ten year period. The Adelman-Robinson model incorporates both Walrasian and 'structuralist' features, such as inflation and rationing as well as rigidities in the functioning of product and factor markets.

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7 For a survey of work on CGE models of developing countries, see Robinson (1989).

The second area of work is the 'structuralist' macro models, which are articulated by Taylor and have their roots in Marx, Kalecki, Kaldor, and Keynes (Taylor, 1983). The 'structuralist' CGE models incorporate features of macro models. For instance, Lysy and Taylor's (1980) CGE model of Brazil uses the 'Keynesian closure' where the nominal wage is assumed to be fixed and the aggregate price level is the macro equilibrating variable. An increase in exogenous investment raises income and real output through the Keynesian multiplier process and generate increased savings to match the higher level of investment. Firms, which are assumed to be on their demand curves for labour, are induced to hire more labour brought about by a rise in the price level which depresses real wage. If the aggregate price level is chosen as the numeraire, then the nominal wage serves as the equilibrating variable to achieve balance between aggregate savings and investment. Much of the controversy on CGE models for developing countries is about the macro 'closure' of the economy-wide models.[8] Both the Adelman-Robinson model and the Taylor-Lysy model contain a number of macro variables and endogenised the aggregate price level.

More recently, with the interest on the impact of macro stabilisation and structural adjustment packages proposed by the International Monetary Fund and World Bank for many developing countries, there has been some effort to integrate macro models with neo-classical, trade-focused CGE models. The novel feature of these models is the combination of macro and micro elements in general equilibrium. The paper by Bourguignon, de Melo and Suwa (1991) introduces the general structure of the 'micro-macro' economy-wide simulation model used in several case studies to assess the impact of adjustment policies on income distribution in a number of countries, such as Côte d'Ivoire, Ecuador, Indonesia, Malaysia and Morocco. The study for Malaysia was undertaken by Demery and Demery (1991), who used the CGE model to examine poverty and macroeconomic policy issues.

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8 See Robinson (1991) for a good discussion of macro closure options in CGE models.

3 ECONOMIC MODELS OF MALAYSIA

3.1 EPU Models

There are three category of economic models in used at the Economic Planning Unit (EPU) of the Prime Minister's Department in Malaysia. Among the earliest economic models developed at EPU was the Gulbranson econometric model in 1982 to assist in forecasting activities. This model was highly aggregated and parameterised on annual time series data for Malaysia. It was built around a set of macroeconomic income-expenditure identities and specified along standard Keynesian lines with exogenous demands acting as the principal forcing variables in the model.

The second modelling approach is the input-output and related modelling, which includes social accounting matrices. The Malaysian input-output accounts for 1972, 1978, 1983 and 1987 were prepared by the Department of Statistics. Using the available input-output accounts, Pyatt and Round (1978) and Demery and Harrigan (1985a) prepared the SAMs for 1972, while Demery and Harrigan (1990) prepared the SAM for 1983. The most sophisticated and best documented input-output planning model for Malaysia was developed as part of the technical input for the Malaysian Industrial Master Plan (UNIDO, 1985). The model is a dynamic input-output model which links capital investment endogenously to output through 'accelerator' relationships where net investment is related to the anticipated or current change in the level of output. This model was subsequently updated using the 1983 input-output accounts to produce projections for the revised Industrial Master Plan (UNIDO, 1992).

Regarding the third modelling approach, several CGE models have been developed for Malaysia at EPU. The earliest CGE model was by Bakar Karim and Frank Lysy in 1980 that was parameterised on the Pyatt and Round (1978) SAM for 1972. This model is highly aggregated in both the goods and factor markets and provides a set of closure options, where the analyst is able to choose alternative macroeconomic identification restrictions. This model has not been revised, updated or used for planning work but it does represent an important milestone in modelling at EPU. In the mid-

[9] EPU has been involved in modelling activity for over fifteen years. Many of the models have been developed independently to serve a variety of purpose and some are no longer in use. Harrigan (1993) provides a survey of the EPU models on which this section is based.

1980s, EPU commissioned a few more CGE models. The Malaysian One Sector System (MOSS), a macroeconomic model with CGE-type characteristics, was developed and described in Demery and Harrigan (1985b). MOSS contained only an aggregated production sector and commodity and one category of labour. It was based on the 1978 SAM (Demery and Harrigan, 1985a) and used principally for training purposes within EPU.

After MOSS, the General Equilibrium Model of Malaysia (GEMM) was developed as the main component of the Malaysian economic-demographic modelling system at EPU. It was developed as an extension and modification of an earlier model SCORE (Demery and Harrigan, 1987) which was used to analyse the implications of long-run population growth and demographic change in Malaysia. GEMM identified five commodities/activities and used the classical macroeconomic closure. It was calibrated on the 1978 SAM information although other relationships, such as those pertaining to labour supply and fertility, were econometrically estimated using micro cross-section data. The model assumed multi-level technologies and utilities. In production there are separate levels for intermediate goods and value-added. At all levels in the production hierarchy, the model assumed CES technologies. At the intermediate goods level, cost minimisation problems were specified and solved for both domestic and imported intermediate commodity demands. At the value-added level of production, again CES cost minimisation was assumed, and for given levels of physical capital stock, the model solves for labour demand. For consumption demands, a similar approach was used in the determination of intermediate goods demands, using a mix of Stone-Geary and CES functional forms. GEMM was subsequently extended to respond to the planning concerns of the Unit, such as the relationship between income distribution and structural economic adjustment.

Demery and Demery (1991) used an extended version of GEMM to assess three counterfactual policy packages against the package chosen by the Malaysian government in dealing with recession in the 1980s. Faced with growing fiscal deficit and widening external debt, the government cut public expenditure, reduced interest rate, and allowed the real exchange rate to depreciate. The simulations address the following questions: What would have been the effect on poor households had the government gone for (a) pre-emptive adjustment and acted earlier than was actually the case; (b) milder fiscal restraint but a bolder devaluation of the ringgit; and (c) stiffer taxes to raise revenue and correct fiscal deficits. Demery and Demery conclude that the government had few alternatives to restore the macroeconomic balances without making matters worse for the poor. The government's chosen policies for cutting and switching expenditures as well as devaluing the exchange rate did much to protect the poor.

M^4, the acronym for the Malaysian Micro Macro Model, is the latest CGE model to be developed at EPU. The model, described in Demery, Harrigan, and McGregor (1992) and Harrigan (1991), has a much richer macroeconomic texture than earlier CGE models described above. It incorporates a number of macroeconomic closures that encompass both Keynesian and Neo-Classical perspectives as well as a range of alternatives in between. M^4 is calibrated on the 1983 SAM and used for historical simulations of the Malaysian economy between 1983-90. The model was subsequently updated to 1990 and extended to address subnational and regional concerns.

An application of M^4 to evaluate policy options is given in Harrigan (1996) which examines the implications of Malaysia adopting a forest conservation policy by surrendering the lumber value of its forest resources to non-lumber uses. Tropical forest conservation is treated as the permanent withdrawal of an immobile resource from the traded goods sector of a small open economy. In the lumber activity, the representative producer is assumed to face an output constraint and seek to minimise cost. The market for Malaysian lumber is cleared through rationing exports, while unsatisfied domestic demand is met through imports. With lumber initially contributing 2 percent to aggregate income, a switch from lumber to non-lumber uses of tropical forests is estimated to cost up to 4 percent of baseline income. The associated dynamic general equilibrium multipliers were found to be larger than unity. The study also found that prompted by the loss of lumber foreign exchange revenue, there was a terms of trade deterioration which accounts for about one half of the total income losses observed. This loss will presumably be greater for countries that rely more heavily on lumber foreign exchange revenue than Malaysia.

3.2 Non-EPU Models

The Malaysian Institute of Economic Research (MIER) model has been used to generate projections on the Malaysian macro economy as well as for policy simulations. This model, described in Semudram, Gan and Chew (1990), is essentially a neo-Keynesian macroeconometric model whereby aggregate income is demand determined. The constraints, which are explicitly imposed on short-run movements in real activities, are made through the commodity sector . The model is disaggregated into several blocks comprising aggregate demand, public sector, balance of payment, monetary sector and price block. It is highly aggregated with a total of 57 equations, of which 28 are stochastic. As a non-CGE model, the MIER model overlooks supply-side issues and would not be able to accommodate issues such as labour shortages that have become important in some sectors of the Malaysian economy.

In his Ph.D. thesis, Gan undertook an empirical study of tariff and trade policy reform of Malaysia using an adapted version of Tower's simple linearised CGE model (Gan, 1985; Gan and Tower, 1987). Unlike the more complex non-linear CGE models, the advantage of this model is its simplicity and flexibility. The utility functions are assumed to be Cobb-Douglas and the model solution relied on matrix inversion and matrix multiplication. The model used a simple 5-sector model of Malaysia with a representative consumer and intermediate inputs used in fixed proportions in combination with a value-added composite comprising labour, land, and capital to assess the consequences of changed tariffs. Gan simulated two versions of the model. In the short-run model, capital was assumed to be sector-specific; in the long-run model, capital was variable, where changes in investment bring an equalisation of the after-tax rate on investment in Malaysia with the rest of the world. The model assumed homogenous labour and perfectly flexible wages and prices, so that resources were fully employed. Gan found that there was a high welfare cost associated with using tariff protection to maintain employment in import-competing sectors. The welfare cost was 91 percent of the value of employment created at the margin in the short run and 113 percent in the long-run. Gan also used the model to calculate shadow prices of goods, labour, and the capital stocks in various sectors to assess the welfare implications of government projects.

Barjoyai Bardai (1993) uses the Keller general equilibrium model (Keller, 1980) to evaluate the MIER 1988 proposals for tax reform in Malaysia in terms of three criteria, namely, efficiency, equity, and revenue generation. The effects of tax changes are evaluated within a static framework where two equilibrium states before and after the tax changes are compared. All relationships are assumed to be linear, implying that the model would be better suited for examining small rather than large changes in taxes. The model adopts the assumptions of perfect competition in the private sector markets, profit maximisation for producers and utility maximisation for households, and equilibrium of the economic system before and after tax changes. The model does not take into account inflation, unemployment, uncertainty and growth. Compensating variation is used to measure tax burden. In the model, there are eight classes of consumers, including foreign and government sectors, 10 industrial groups, and 19 goods or expenditure categories.

After model calibration and construction of the data set for the benchmark equilibrium, Bardai compared the effects of changes in the main tax categories on their respective tax incidence. In addition, he examined the MIER tax reform proposals that included the following: reducing corporation tax by 10 percent, introducing the value added tax (VAT) system, increasing sales tax as a short-term measure before the introduction of VAT, reducing export tax, and broadening the base of import tax. Bardai argued that rather than reducing corporate tax, which is one of the most efficient and productive tax instruments, payroll tax should be reduced instead in order to reduce the cost of doing business in Malaysia. He favoured the introduction of VAT that was desirable from the efficiency, equity, and tax revenue productivity criterion and would not create inflation. He supported abolishing export taxes and proposed increasing the tax rates on clothing and footwear and manufacturing durables.

4 DESCRIPTION OF THE MALAYSIAN MICRO-MACRO MODEL

This section presents an outline of the Malaysian Micro-Macro Model (M^4) which we use in the tax simulations that follow. M^4 is a computable general equilibrium model belonging to the family of models described by Robinson (1991) and Bourguignon, Branson and de Melo (1992). The model is specified for a small open economy. The foreign sector describes both international trade in goods and services as well as trade in financial assets. A novel feature of M^4 is providing users with an extensive menu of specification options that enable them to change parameters, behavioural assumptions, and macroeconomic identification restrictions and choose alternative characterisation of the Malaysian economy, if they so desire.

M^4 encompasses macro and micro links in a general equilibrium framework. Since there are both the macro as well as the micro elements of the model, M^4 is provides a rich framework for policy analysis. It is much broader than the standard open-economy IS/LM framework or the neo-classical CGE models used to analyse long-run trade and tax issues. There is much more disaggregation of the product and factor markets in M^4 than the IS/LM framework; it has a financial component in addition to the real side of the standard CGE model. M^4 can be applied to focus on questions of achieving equilibrium among various macro aggregates and the structural impact of changes in the composition of the macro aggregates, such as savings-investment balance, balance of trade, government deficit, exports and imports. It also provides a good framework for analysing changes arising from a tax reform.

As noted by Robinson (1991: 1513), there are two approaches to bringing macro features into a CGE model: (1) relationships among the macro aggregates are based on macroeconomic theory and lie outside of the CGE model; and (2) financial variables are included in the CGE model and the notion of equilibrium is expanded to incorporate the loanable funds market, assets, and expectations. M^4 adopts the second approach and directly incorporates macro phenomena into an operational CGE framework. It provides for an asset market closure in which the loanable funds market, with the variety of different assets, and the nominal exchange rate can be specified.

4.1 Links Between Real–Financial Economies

Although M^4 shares some similar features with the financial CGE model of Bourguignon, Branson, and de Melo (1989), there is a difference in which changes in assets and liabilities are treated. The model by Bourguignon *et. al* is expressed in asset flows based on the assumption that adjustments in asset holdings are made at the margin, and actors are either unable or do not wish to restructure their portfolios completely for every period. In M^4 the assets are treated as stocks, and the bond or loan rates adjust to clear the demand and supplies of the stocks of the assets. Stocks are given more prominence in M^4 than other comparable models. In fact, one of the novel features of M^4 is that transactors' balance sheet positions are modelled directly so that flows of funds emerge in the movement from one stock position to another. Changes in asset stocks, particularly private sector wealth, provide an important transmission mechanism from the financial to the real economies. The links between real and financial economies are captured through endogenous interest rate changes.

Before going into the details of the model structure, it might be useful to consider the interactions between the real and financial components of the model. Since the model is for an open economy, the balance of trade acts as a equilibrating mechanism for achieving savings–investment balance.[10] As a system constraint, some CGE models place the requirement that the exchange rate serves as the equilibrating variable to bring the balance of trade into equilibrium. There is no such requirement for trade balance in M^4, and it allows for a surplus or deficit in the balance of trade. Under our assumption of flexible exchange rate with perfect capital mobility and elastic supply of foreign capital to the Malaysian economy, there could be unlimited capital inflows from the rest of the world to make up for the balance of payments deficit. Changes in the flexible exchange rate would affect aggregate savings through changes in the value of the balance of trade. The savings–investment link is made stronger because the balance of trade, which is endogenous in the model, adjusts to achieve equilibrium between savings and investment.

In our model, the current account balance is endogenous. Together with other asset yields, the nominal exchange rate adjusts to bring about the asset market equilibrium. Changes in the real exchange rate affects the competitiveness of and demand for exports, thereby changing the structure of production. There is also the role of the interest rate on the real-financial interactions. The supply and demand for loanable funds respond to changes in the interest rate. With the endogenous balance of trade assumed in M^4, the interest rate can affect investment, capital flows, the real exchange

[10] The nominal system constraint for savings–investment is given by: $S^P + S^G + r \cdot B - I = 0$, where S^P is private savings, S^G is government savings, r is exchange rate, B is balance of trade, and I is investment.

rate, the balance of trade, which in turn influence the structure of production and employment.

4.2 Model Structure

There are eight basic transactors in the model: households, government, non-financial corporations, non-financial public enterprises, banks, Employees Provident Fund, other financial institutions, and the rest of the world. Except for households and the rest of the world, six of the agents are institutional transactors that participate in asset markets and for whom flow and stock accounts are separately collated. M^4 has thirteen goods markets, [11] five labour markets,[12] and four asset markets.[13] The classification of transactors and markets is circumscribed by available data and the need for sufficient sectoral detail for policy simulations at the macroeconomic level. M^4 makes a distinction between activities and commodities. Activities produce the goods which are sold in commodity markets. For the factor markets, the model identifies five labour markets and three occupational groups.[14] Labour is mobile across sectors and occupations in response to wage and excess demand differentials. Physical capital is categorised into a corporate and an unincorporated component. Capital and land are aggregated in a Hicks composite factor. They are quasi fixed, with their sectoral allocation responding to relative rewards through the allocation of net investment. The four primary asset markets are identified by the financial instruments. The supply and demand of these markets are equated by the adjustment of relative yields.

As with other CGE models, the behavioural rules for the model are that producer are assumed to maximise profit subject to multi-level constant returns CES technology constraints and households maximise utility subject to income constraints. These determine input demands and output supplies. Demands that are not satisfied domestically are made up by imports. Agents make their decisions on the basis of price signals they observe. In the model specification adopted, we assume a perfectly

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[11] Export Agriculture, Domestic Agriculture, Forestry, Mining, Resource Manufacturing, Competitive Manufacturing, Domestic Manufacturing, Private Services, Oil, Construction, Utilities, Government Services, and Dwellings.

[12] Agricultural, Professional Non-Agricultural, Skilled Non-Agricultural, Unskilled Non-Agricultural, and Public Sector.

[13] Currency, Domestic and Foreign Equity, Loans and Deposits, and Other Domestic Assets.

[14] Professional and Administrative workers, Clerical and Skilled workers, and Production and Unskilled workers.

competitive goods market and market clearing for the labour market. This means that prices are flexible and each agent is a price taker. Prices are the equilibrating variable and adjust to clear the markets for goods, factors, labour, and asset; in other words, equilibrium is achieved when all excess demands are zero, as specified in the system constraints. Markets clear in each period (one calendar year), though there are some elements of quantity adjustments in the goods markets. There are no extrinsic dynamics in the model, other than through its adaptive treatment of expectations. Nevertheless, it has extensive intrinsic dynamic relationships governing the accumulation of all physical and financial stocks. Asset markets clear at the end of each period through the adjustment of interest rates and the nominal exchange rate.

As given by the production function, agents transform labour, capital and intermediate output into goods for the domestic and export markets. The function for transforming output into different goods for domestic sales and export is described by the constant elasticity of transformation. Since this is a multisectoral model, it is assumed that goods for domestic sales and exports are different even if they share the same sectoral classification. For the import demand function, we assume the Armington function, that is, domestic goods sold on the domestic market are imperfect substitutes for imports. The purchasers of goods demand a composite commodity, which is described by a CES aggregation of imported and domestic goods. Investment demand is exogenous for some activities, while for other it is an increasing function of Tobin's 'q', which is the ratio of the marginal revenue product of capital to its user cost. More details on the model structure are provided in Appendix 1.

For its solution, M^4 uses the Levenberg-Marquardt algorithm which exploits the power of both 'inverse-Hessian' and 'steepest descent' function minimisation methods. When iterates are far from the final solution, the algorithm approximates steepest descent and as iterates move closer to their terminal values, inverse-Hessian updates are computed. Essentially, through a recursive ordering of the equations, variable elimination is achieved and the model is then solved as a constrained non-linear, least squares optimisation problem.

4.3 Data Base and Updating

The initial database for the model was the Social Accounting Matrix 1983 for Malaysia (Demery and Harrigan, 1990) which compiled the social accounts, flow of funds and asset stock data collated for the period 1983-84 into a consistent framework. M^4 was subsequently recalibrated on the more recent data with available Malaysian National Accounts for 1990. Although the M^4 database is more recent than most other Malaysian models on the economy, the original database is over a decade old. There might be some concern that unless the data can be updated, the usefulness of this model may be compromised. There are some options available to address this issue. The data in the model could be updated by the user by incorporating the latest economic trends gathered from published data in the exogenous data set, as we have done for our tax simulations. For instance, one area of rapid change is the composition of demand, especially the rapid increase in import and export demand starting from 1988. In addition, the manufacturing sector expanded rapidly during the late 1980s. This was triggered by a combination of the relaxation of controls on export-oriented manufacturing investment, the policy of keeping the ringgit and unit labour cost low, and deregulation of the investment policy.

The model enables other forms of 'updating' to be carried out. The technology model accommodates various forms (Hicks, Harrod and Solow) as well as different rates of technological progress. The improvement in labour productivity can be specified in the model to reflect the modernisation of the economic sectors, particularly manufacturing. The model's intrinsic dynamic relationship would also address depreciation of the stock variables as the model moves through time.

4.4 Model Specifications

As the basic model for our tax policy reform simulations, we have adopted an essentially neo-classical model specification, with the supply-side driving the economy. We provide a description of the basic model assumptions below and in Table 5.1, but more details on the specifications are provided in Appendix 2. Admittedly, many of these

TABLE 5.1 MODEL ASSUMPTIONS

Model Characterisation	*Neo-classical*
Labour markets	Market Clearing for the five categories of labour. Nominal and real wages endogenously determined. Unemployment set at 5 percent exogenously.
Goods Markets	Mostly perfectly competitive except for utilities, owner occupied residence, and government services. Law of one price options activated for export agriculture, forestry, and oil and gas. Elsewhere high substitution elasticities between traded domestic and foreign output.
Asset Markets	Freely determined asset yields. Flexible exchange rate with a managed float. Transactions rather than speculative motives dominate demand for money. Passive budget constraint with endogenous government financial surplus/deficit.
Technologies	Constant returns. Price generally equated to marginal cost. Multi-level CES technology. Substitution elasticities low for intermediate inputs and high substitution between domestic and imported intermediate components.
Trade	Competitive determination of all imports. Armington specification for imports and domestic output. Export demands determined by domestic and international prices.
Demands	Public sector recurrent and capital are exogenous, while private investment is a function of Tobin's q. Stone-Geary linear expenditure system to decompose aggregate consumption expenditure.
Supplies	Higher degrees of mobility, strong relative price pulls.
Period of Analysis	Ten years
Technical Progress	Always exogenous
Expectations	Less strongly adaptive.
Adjustment Costs	Insignificant

assumptions are subjective in nature, but in the absence of hard evidence such subjectivity is unavoidable. Through model calibration, we arrive at a working model that provides a fair representation of the Malaysian economy in the medium term. These assumptions appear to reflect the macroeconomic framework and objectives that are embodied in Malaysia's Second Outline Perspective Plan.

Goods markets closure. In the goods markets, we assume perfect competition for ten goods markets, which exclude utilities, owner occupied dwellings and government services. Utilities is based on a mark-up of 1.0, which is expressed as the ratio of the basic price of activity output (exclusive of all taxes) to marginal cost. The household consumption of owner occupied dwellings adjusts passively to satisfy endogenous imputed rent plus a small amount of current account expenditure attached to imputed rent. The flow of government services is supply driven through simple technology relationships and exogenous employment in the government sector. In addition, world prices are imposed on export agriculture, forestry, and oil and gas commodities. There are also export quotas on oil and forestry products.

Labour markets closure. We assume market clearing for the five categories of labour, that is, where wage is determined by equating demand and supply of agriculture, professional, skilled, semi-skilled, and unskilled workers. This is not an unreasonable assumption because the period under consideration is for the medium term and published data suggest that Malaysia is close to full employment, although some frictional unemployment remains. The labour markets are assumed to clear in each period and satisfy an exogenously determined equilibrium unemployment rate of 5 percent. Nominal and real wages in each labour market are determined endogenously, while the level and growth rate for labour supply are specified exogenously. We have not opted for an endogenous labour supply because as will be shown in Chapter 7, the labour supply for both males and females are inelastic and negatively related to wages, suggesting that the labour supply curves are backward bending. Furthermore, the effect of income tax on labour supply is negligible. For the purpose of our simulations, aggregate labour force is assumed to grow at around 3 percent per annum, with the markets for non-agricultural labour growing faster than agricultural labour. This pattern of labour supply growth is in keeping with actual trends exhibited in the Malaysian economy during the eighties and early nineties.

Asset market closure. The asset market closure is treated in terms of key asset market prices or yields, namely, the bond rate, the lending rate, and the nominal exchange rate. The bond rate and the lending rate are assumed to be flexible so that they adjust to clear the demand and supplies of the stocks of those assets. The nominal exchange rate is assumed to be a flexible exchange rate regime with a managed float. For the public sector, we assume a 'passive' budget constraint where the government's financial surplus and deficit is fully endogenous.

Expectations closure. Expectations in M^4 are assumed to be formed adaptively. Agents are assumed to revise previous periods' expectations of the nominal exchange rate and inflationary expectations by the parameter value of 0.2. The parameters are bound by zero and unity; the larger the parameter value, the greater would be the influence of past forecast errors on current expectations of future prices. Since the value of 0.2 is chosen, this means that expectations are less strongly adaptive, which is reasonable for a neo-classical model specification.

Production. The assumptions adopted for technology are fairly standard. Activity output is produced with a multi-level CES technology where the rates of substitution between factors may vary at each level. We assume low substitution for different intermediate inputs (0.25) and high substitution between domestic and import intermediate components (0.50 and above). We also assumed low substitution (0.25) between aggregate intermediate inputs and value-added. At the value-added level, the elasticity of substitution between capital and labour varies across sectors. The elasticity of substitution is assumed to be high (0.75) for agriculture, forestry and construction, medium (0.5) for manufacturing, and low (0.25) for oil and gas, mining and utilities. The substitution composite labour technology varies between 0.25 and 0.50 for the activities.

Trade. The nature of the demands for imports and exports are determined under this module. Import and export demands are disaggregated by commodity. In the model, imports are classified by intermediate, consumption and investment uses. We assume that the competitive option is applied in the determination of all imports. This activates the

Armington specification which requires some assumptions on the substitution elasticities. Imports respond to relative prices and domestic demand. For our model, we assume that the law of one price (LOP) closure is applied to export agriculture, forestry, and oil and gas, where Malaysian producers accept world prices (in foreign currency units) when making their supply decisions. In all other activities, Malaysian producers enjoy some degree of price autonomy. For resource and traded manufacturing exports we impose export price elasticities that are comparatively large (≥ 5), which are close to those estimated by Reidel (1988) for Hong Kong's manufactures. Export demands are determined by domestic prices relative to the prices of similar commodities produced elsewhere in the world.

Demand. For the demand components, public sector recurrent and capital expenditure are exogenously determined. Private investment is a function of Tobin's q. All other demand components are taken to be endogenous to the model. Private consumption is a function of household disposable income, but is also affected by private sector wealth (determined by capital accumulation net of foreign indebtedness) and interest rates.

Growth rates of sectoral output are determined endogenously for all sectors except forestry, oil and LNG and public services. In establishing the sectoral growth rates, we are guided by the targets set in the *Second Outline Perspective Plan, 1991-2000* (Malaysia, 1991). During the decade, forestry output is assumed to exhibit constant growth, oil and LNG production grows very slowly at 1.5 percent per annum, and public services output grows at the economy-wide average rate of around 8 percent per annum. For the remaining sectors of the economy, the growth trend is determined largely by the assumed growth rates of their capital stocks (net investment) and the rate of growth of labour augmenting technological progress. Our assumptions imply fast growth in manufacturing (10-15 percent) and private services (9 percent); slow growth in agriculture in agriculture and mining (1-3 percent), and average growth (7-8 percent) in the remaining sectors. These growth rates are not unreasonable given the track record of sectoral growth, especially during the last few years.

The Stone-Geary linear expenditure system is used to decompose aggregate consumption expenditures. The demands for durable and semi-durable goods are assumed to be income elastic while the demand for food and drink is income inelastic. Other income elasticities are close to unity. The equations governing the split of consumption demands into their domestic and imported components have universally high substitution elasticities. In the case of investment, the demands for capital goods by NFPEs and the government are treated as exogenous. The demand for capital goods by the other activities are determined endogenously. Investment demands are translated into demands for commodities via a capital aggregation matrix and split into their domestic and imported components using Armington relationship.

Finance. In the asset markets, interest rates and nominal effective exchange rate are market determined. The supply of base money, foreign currency (backing money) and bonds are set exogenously at a growth rate that imply inflation of 2-3 percent per annum. The public sector finances its residual deficit by borrowing from foreign sources, the supply of which is infinitely elastic at world interest rate. The nominal effective exchange rate adjusts in each period, and together with the model's asset yields, bring about an equilibrium in the asset market at end of period.

5 MODEL CALIBRATION

The model is calibrated against actual data over the period 1990-95. Two sets of controls are used:

1. National Accounts controls for variables, such as real GDP, consumption, investment, government expenditure, exports, imports, etc.
2. Tax receipts in current prices.

The aim of this exercise is to 'mimic' as closely as possible the structure and trends of the economy. It is important to bear in mind that unlike time-series models, CGE models such as M^4 are better in projecting broad trends of economic developments rather than short-run business cycle fluctuations. What is essential in the calibration exercise is whether the model can produce estimates for a number of key endogenous variables that correspond to actual outcomes.

After calibrating the model with published macroeconomic data, we arrived at the baseline model that was used for subsequent tax reform simulations. The model predictions and the published figures of the Economic Report are given in Table 5.2. Generally, the model reproduces the macroeconomic developments between 1990-95 rather well, although estimates for some variables are closer to published data than others. The annual growth rates for nominal GDP, private consumption and government consumption generated by the model are fairly close to the published data for 1990-95. The model's estimated growth rates are lower for total investment, exports and imports than published data, though not unreasonably so. The base-run trajectories of nominal GDP, consumption, investment, export and import for 1990-95 are shown in Figure 5.2.

In the second stage, we calibrated the model against the published tax receipts in current prices for 1990-95. The following taxes are represented in the exogenous database:

1. Domestic Taxes (intermediate uses, consumption uses, and capital uses)
2. Export Taxes
3. Import Taxes (intermediate uses, consumption uses, and capital uses)

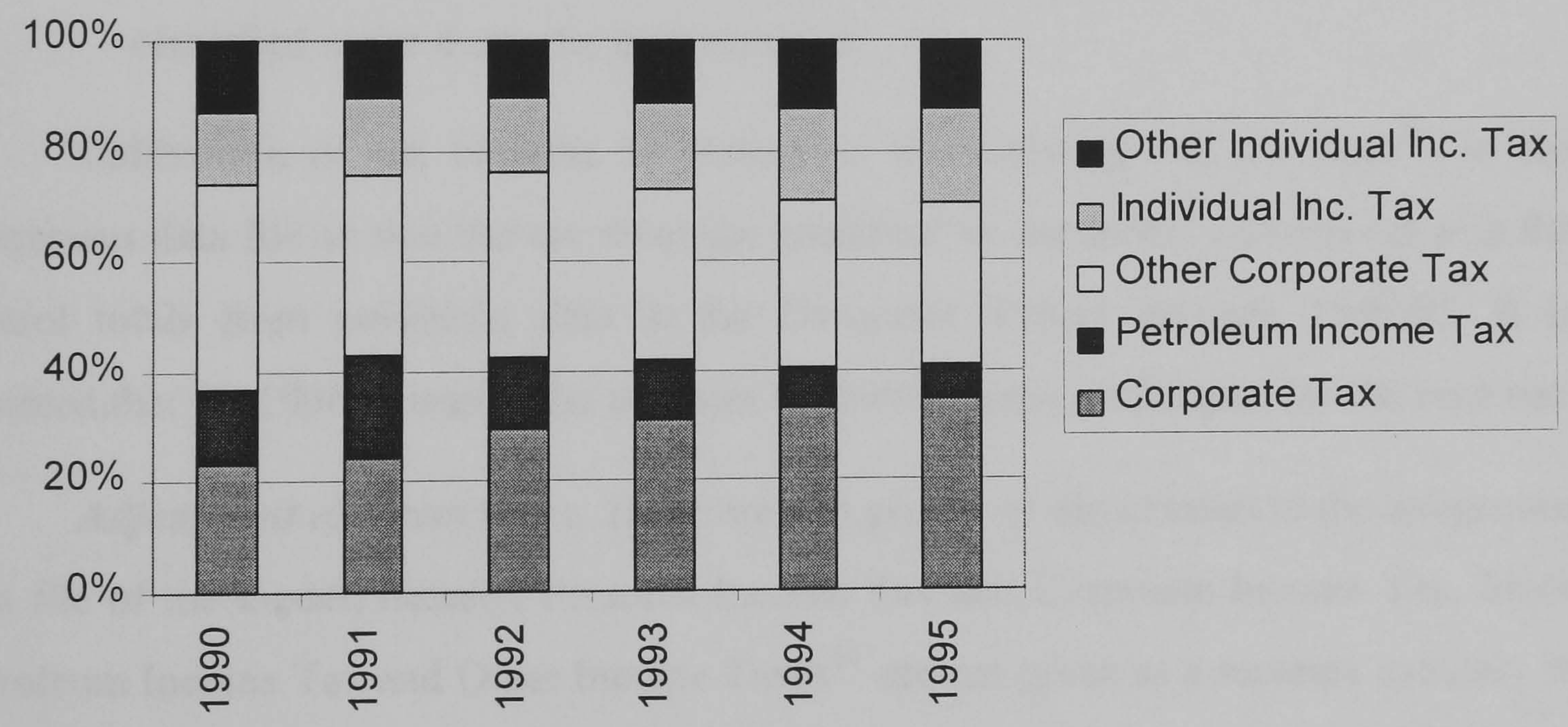
TABLE 5.2 BASE-RUN SIMULATION WITH ECONOMIC REPORT DATA

(In RM Millions and 1983 Constant Prices)

	1990		*1995*		*Growth Rate (%) 1991-95*	
	Model	*Adj. ER*	*Model*	*Adj. ER*	*Model*	*Adj. ER*
GDP	103,636	103,723.7	155,547	154,955.7	8.4	8.3
Private Consumption	51,458	52,907.8	75,993	74,242.4	8.1	7.0
Govt Consumption	13,439	12,695.5	18,560	18,429.6	6.7	7.7
Total Investment	33,582	33,986.5	58,164	64,583.0	11.6	13.7
Exports	84,117	80,846.5	156,432	159,604.7	13.2	14.6
Imports	78,972	75,836.7	153,407	162,106.6	14.2	16.4

Adj. ER refers to adjusted Economic Report figures. The aggregate figures in the Economic Report are given in current prices as well as 1978 constant prices. It was necessary to adjust the ER figures into 1983 constant prices to make them comparable with the figures generated by the model.

Figure 5.1 Composition of Direct Taxes, 1990-95



4. Non-Commodity Taxes

5. Household Income Tax

6. Corporate Tax

M^4 is a sectoral model that provides rich details about production sectors. This is an over-simplification of the complex structure of tax rates in practice, but in a micro-macro model of this type, including a highly detailed structure of taxes would make the model excessively unwieldy and undesirable. M^4 treats direct taxes as simply proportional to income and indirect taxes as *ad valorem* taxes. Because of this, the tax categories in M^4 do not always match conveniently with those published in government accounts. Three specific problems should be stressed:

1. M^4 has consolidated government accounts and does not distinguish central from local or state government. This is particularly problematic since the latter has grown significantly since 1983.

2. M^4 does not separately identify petroleum tax, but taxes the consolidated corporate sector income.

3. Sales and service taxes and excise duties are not separately identified but classified under domestic indirect taxes.

Calibration of tax revenue is performed by adjusting the tax rates[15] in the exogenous data file so that the tax revenues predicted by the model correspond with the control totals from published data in the Economic Report between 1990-95. It is assumed that for 1996 onwards, the tax rates for 1995 remain unchanged for the base run.

Adjustment of direct taxes. There are two groups of direct taxes in the exogenous data file of the model, namely, Personal Income Tax and Corporate Income Tax. Since Petroleum Income Tax and Other Income Taxes[16] are not given as a separate category in the exogenous data set, we have combined Petroleum Income Tax with Corporate Income Tax. As for Other Income Taxes, revenue from this source is distributed proportionately between corporate and personal income taxes.

[15] The model assumes that the marginal tax rate is equal to the average tax rate.

[16] This residual category of income taxes include stamp duty, capital gains duty, estate duty, and film rental tax.

In the government accounts, the revenue sources received by the Federal Government are given in some detail, but not for revenue received by the state and local governments and statutory authorities, which are given in aggregate. For data consistency, care was taken to ensure that the payments made by institutions and transactors to government agencies should be reflected on the receipt side. For modelling purpose, we treat the Own Sources of Revenue category for state and local governments and statutory authorities as tax revenues. The approach adopted was to consider these sources of revenue as dependent on the income flows of households and corporations, even though they are not levied as a proportion of these. The rationale for this approach is that the revenues received by state and local governments tend to be related to property ownership and wealth, such as land taxes and property assessment rates. These are likely to move with income. The revenue from statutory authorities is derived from services rendered to households and firms. The demand for these services is assumed to be a function of income. The composition of actual direct taxes is shown in Figure 5.1. This chart makes a distinction between Personal Income Tax and Corporate Tax received by the Federal Government and the Other Personal Income Tax and Other Corporate Tax categories that resulted from the adjustments made.

Adjustment of indirect taxes. The exogenous data file provides export duties, import duties, domestic indirect taxes and non-commodity taxes as separate categories. In the model, sales and service taxes, excise duties and other indirect taxes are grouped under domestic indirect taxes because their contribution to total revenue was small in the 1983 SAM. Non-commodity taxes refer to the revenue for the Federal Government coming from a disparate list of revenue items. They include earnings from government commercial undertakings, interest and returns on investment, licences, service fees, road tax, fines and forfeitures, rental revenue from Federal Territories, contributions from foreign governments and international agencies, and petroleum royalties and gas cash payments. This category of taxes is calculated in the model by relating them to value added. Table 5.3 shows the base-run estimates on revenue, expenditure and budget deficits and the control totals based on published data for 1990

TABLE 5.3 BASELINE REVENUE WITH ECONOMIC REPORT DATA

	1990		*1995*	
	Model	*Control*	*Model*	*Control*
Export Tax	1,977	1,970	957	989
Import Tax	3,374	3,420	5,942	6,014
Domestic Indirect Taxes	5,407	5,452	10,515	10,691
Personal Income Tax	–	2,702	–	5,935
Corporate Tax	–	7,700	–	14,250
Adjusted Personal Income Tax	5,036	5,027	9,077	9,002
Adjusted Corporate Tax	14,480	14,326	22,331	21,614
Total Tax Revenue	30,274	30,195	48,822	48,310
Non-Commodity Tax	6,781	–	5,712	–
Interest Received	1,359	–	3,025	–
Rest of the World Transfers to Government	142	–	220	–
Non-Tax Revenue	8,282	8,277	8,957	8,955
Consolidated Govt Revenue	38,558	38,472	57,780	57,265
Consolidated Govt Operating Expenditure	30,105	29,409	40,807	40,627
Consolidated Govt Current Surplus	8,453	9,063	16,973	16,638
Consolidated Govt Development Expenditure	9,923	10,076	17,098	16,182
Consolidated Govt. Financial Surplus	-1,470	-1,013	-125	456

The control totals are based on published data in the *Economic Report 1994/95*.

Note:

1. Estimates for Personal Income Tax and Corporate Tax include the apportionment of Petroleum Income Tax and Other Income Tax. To derive the Adjusted Personal Income Tax and Adjusted Corporate Tax, revenue from State Government, Local Authorities and Statutory Authorities are added to these estimates. The model provides estimates only for Adjusted Personal Income Tax and Adjusted Corporate Tax.
2. Non-Commodity Tax = Non-Tax Revenue – Interest Received – Rest of the World Transfer to Government

BASELINE SIMULATION (BL)

Figure 5.2 BL: Growth of Tax Revenue

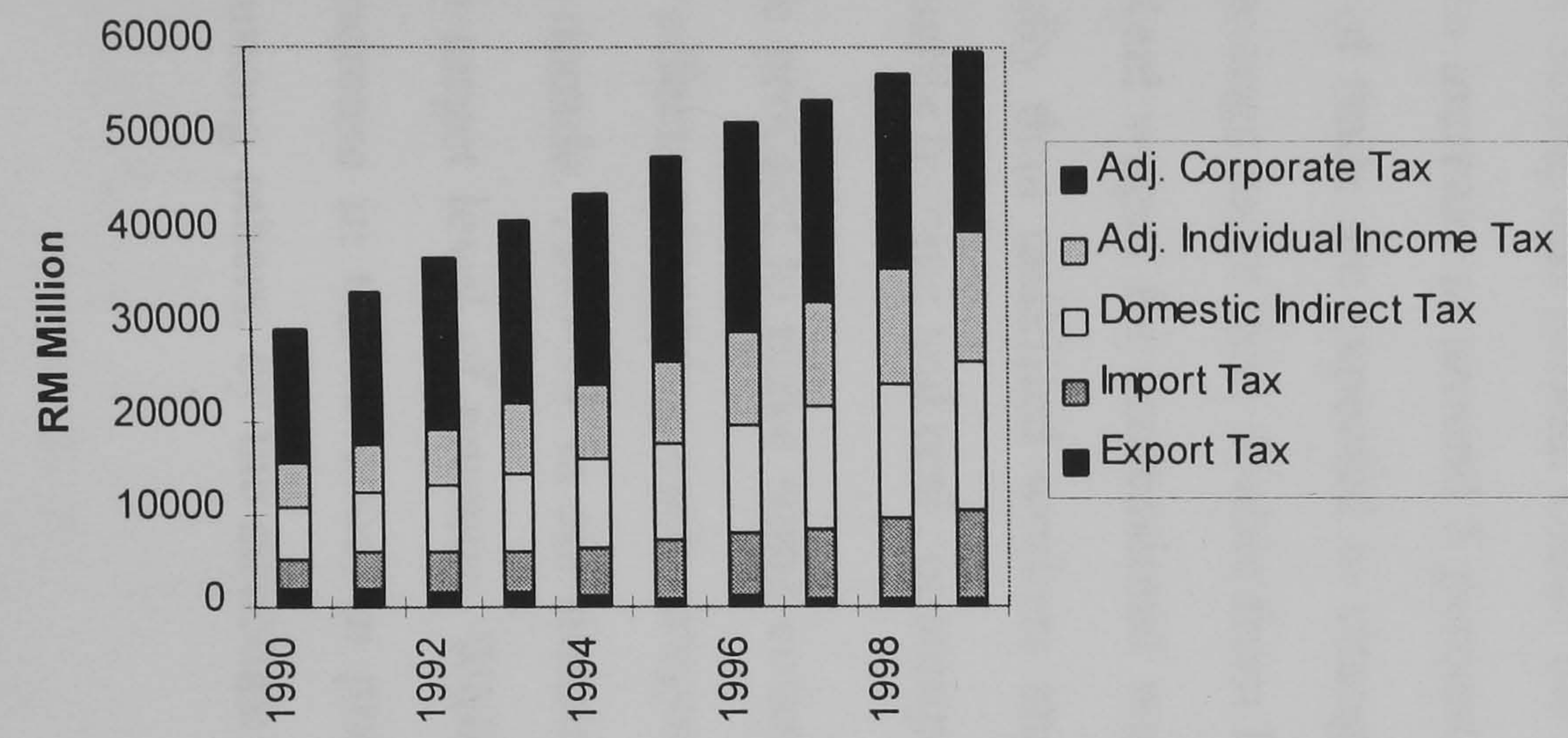


Figure 5.3 BL: Composition of Tax Revenue

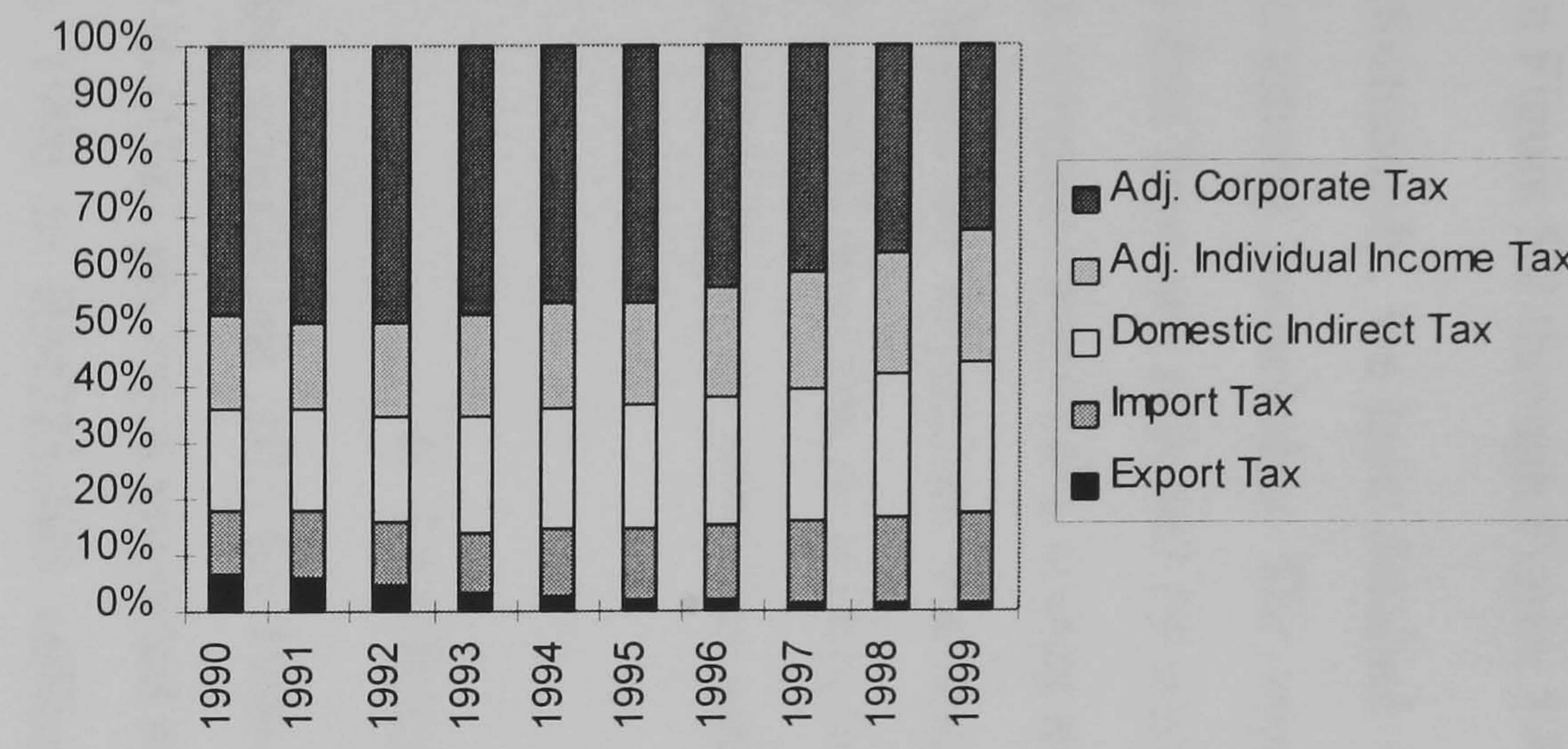


Figure 5.4 BL: Contribution to GDP

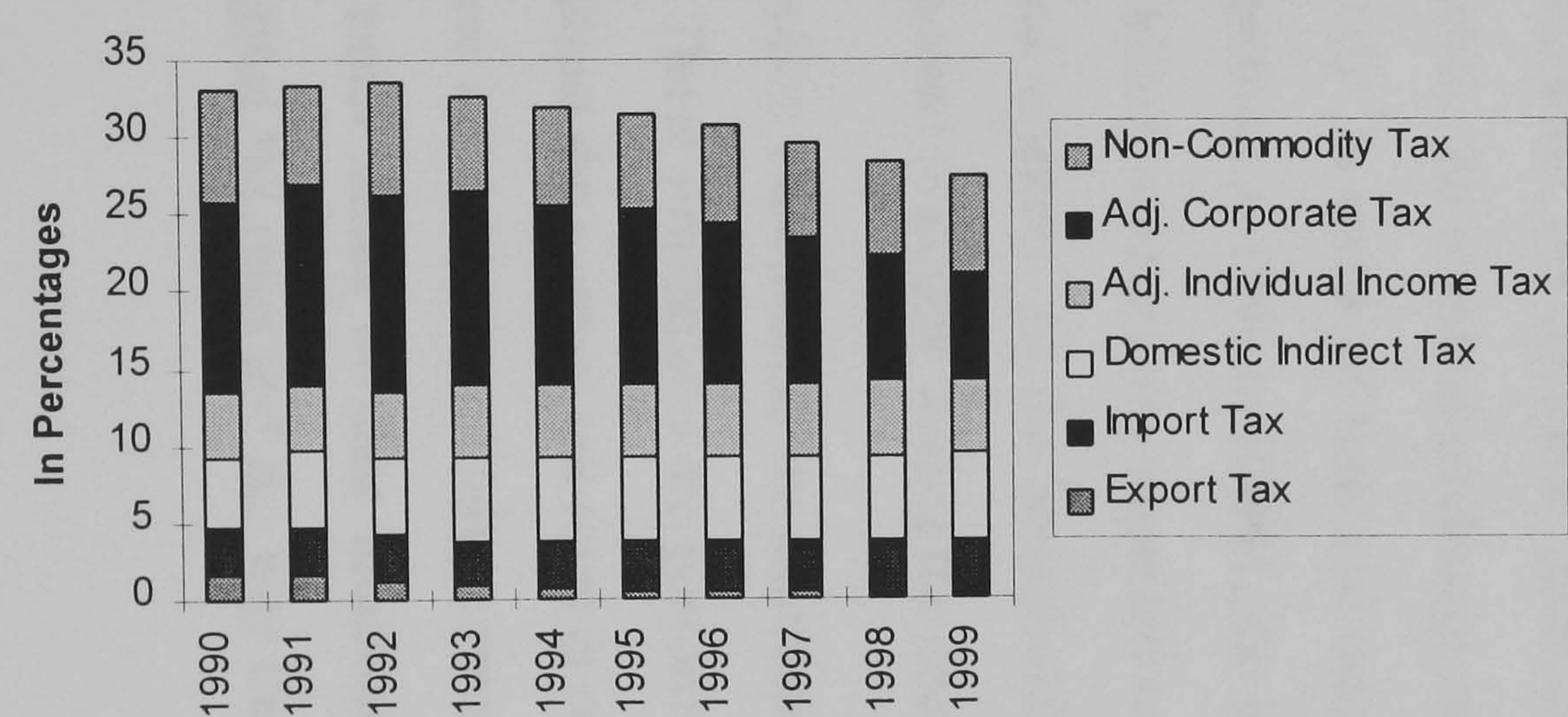
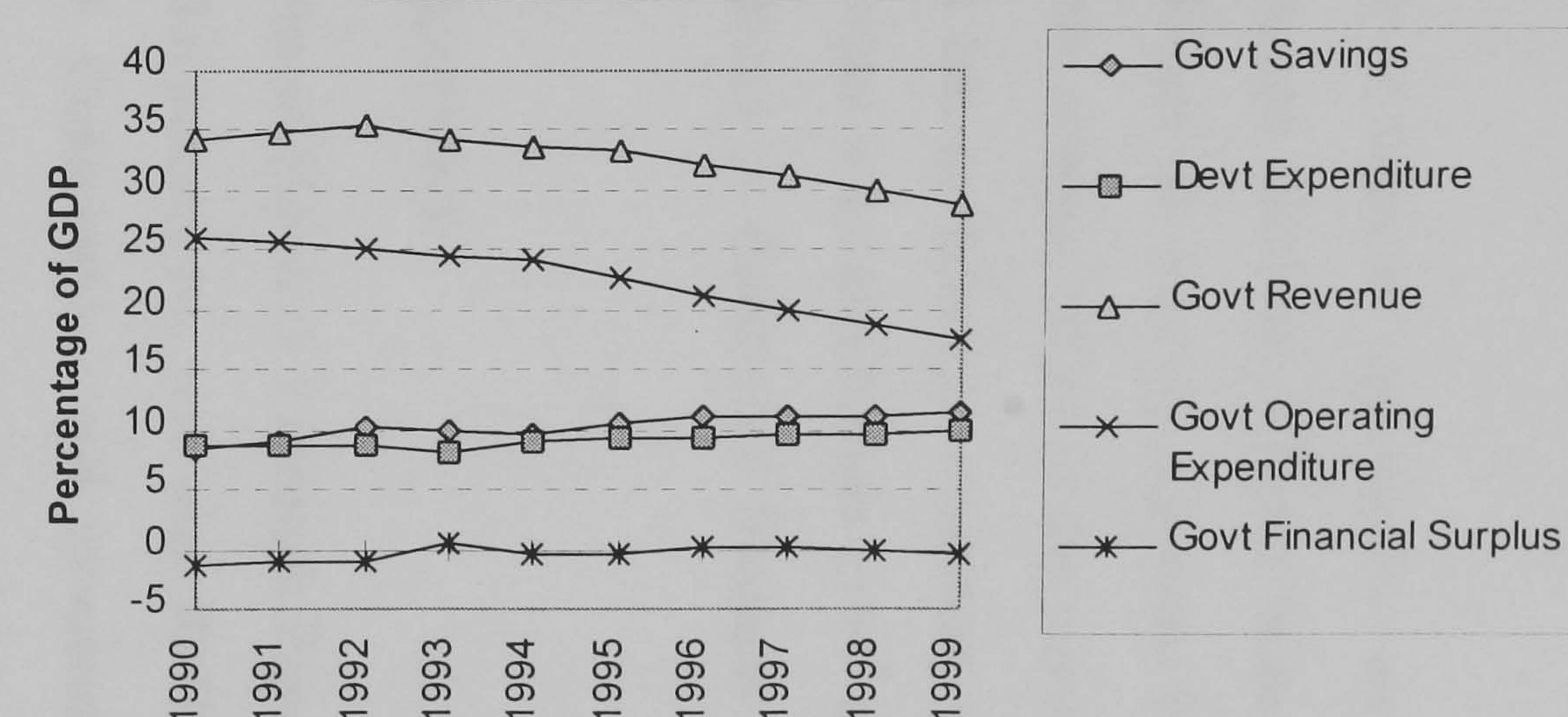


Figure 5.5 BL: Government Finance



and 1995 in current prices. The growth and composition of tax revenue generated by M^4 are given in Figure 5.2 through Figure 5.4.

Unfortunately, we lack detailed information on taxes by commodity, sector, or distribution among households. The import, export, and domestic indirect taxes in the exogenous data base are adjusted by scaling the relevant tax rates on a pro-rata basis so that the tax revenues from each source match with the revenue tables of the government accounts. While we appreciate that this approach has an inherent weakness, it does convey the general direction of policy. In addition, there is no mechanism in M^4 through which lump-sum taxes or subsidies could be imposed or distributed (Demery *et al.*, 1992).

6 TAX POLICY SIMULATIONS

The baseline simulations (BL) for 1990-99 are given in Figure 5.5 through Figure 5.9. Real GDP in (1983 prices) is projected to grow by 8.6 percent per year from RM106,500 million in 1990 to RM225,400 million in 1999. Consumption and investment are expected to grow rapidly, with real annual growth rates averaging between 8-8.5 percent per annum during this period. Under the baseline simulation, the consumer price index is expected to increase at around 5 percent per year, while the nominal exchange rate and the terms of trade are expected to change very slightly. In terms of financial surpluses, national savings more than double from RM29,500 million in 1990 to RM91,300 million in 1999. Real wages for professional workers and skilled workers are expected to grow more rapidly than unskilled workers and agricultural workers. At the household level, real disposable income and real consumption are expected to double during the decade.

We proceed to make some counterfactual policy experiments by examining the economic effects of varying each category of taxes. These simulations are performed for the whole decade, 1990-99. In our simulations, we adjust the average tax rates in order to generate a target level of revenue. While an increase in tax rate generally corresponds with an increase in tax revenue, in practices the exact nature of their relationship is affected, among others, by the structure of the marginal tax rates and the way the taxes

Figure 5.6 BL: GDP Aggregates (In 1983 Prices)

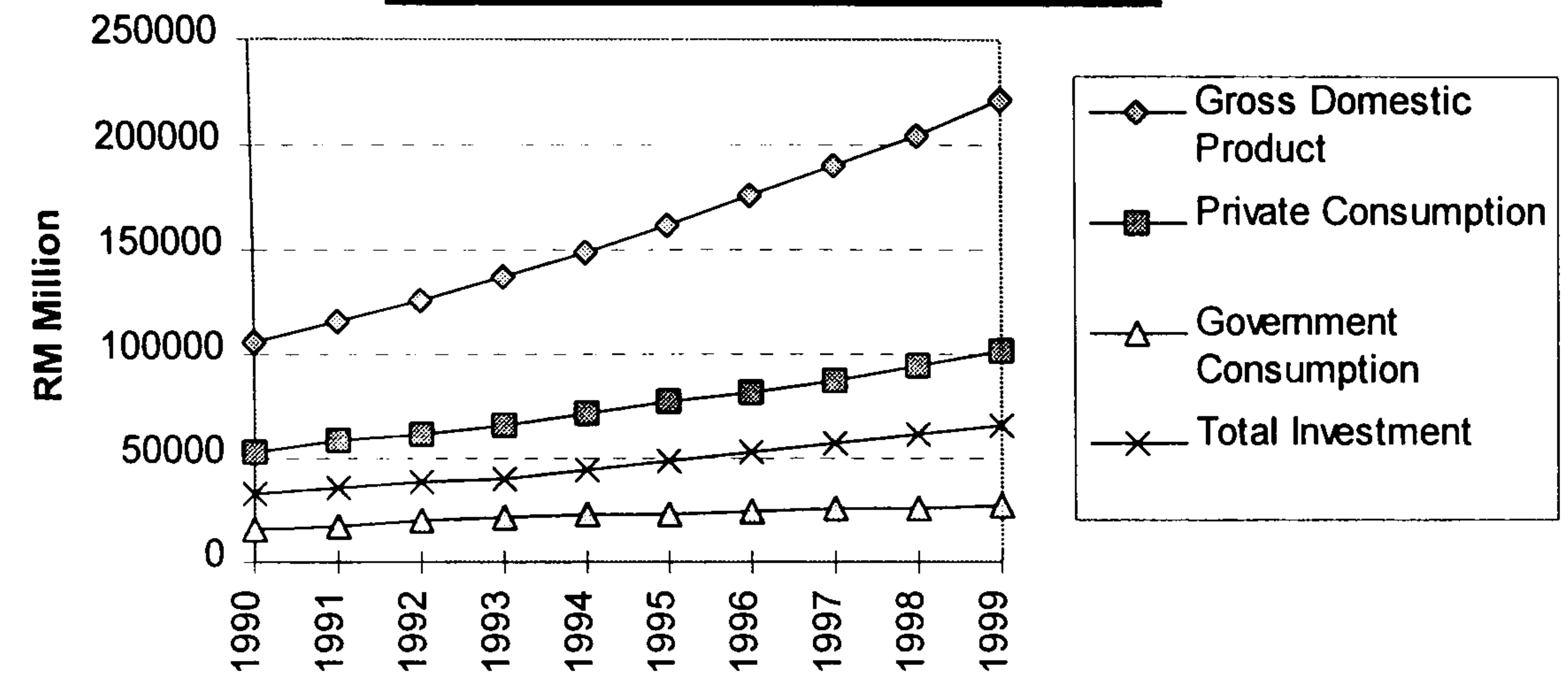


Figure 5.7 BL: Aggregate Prices

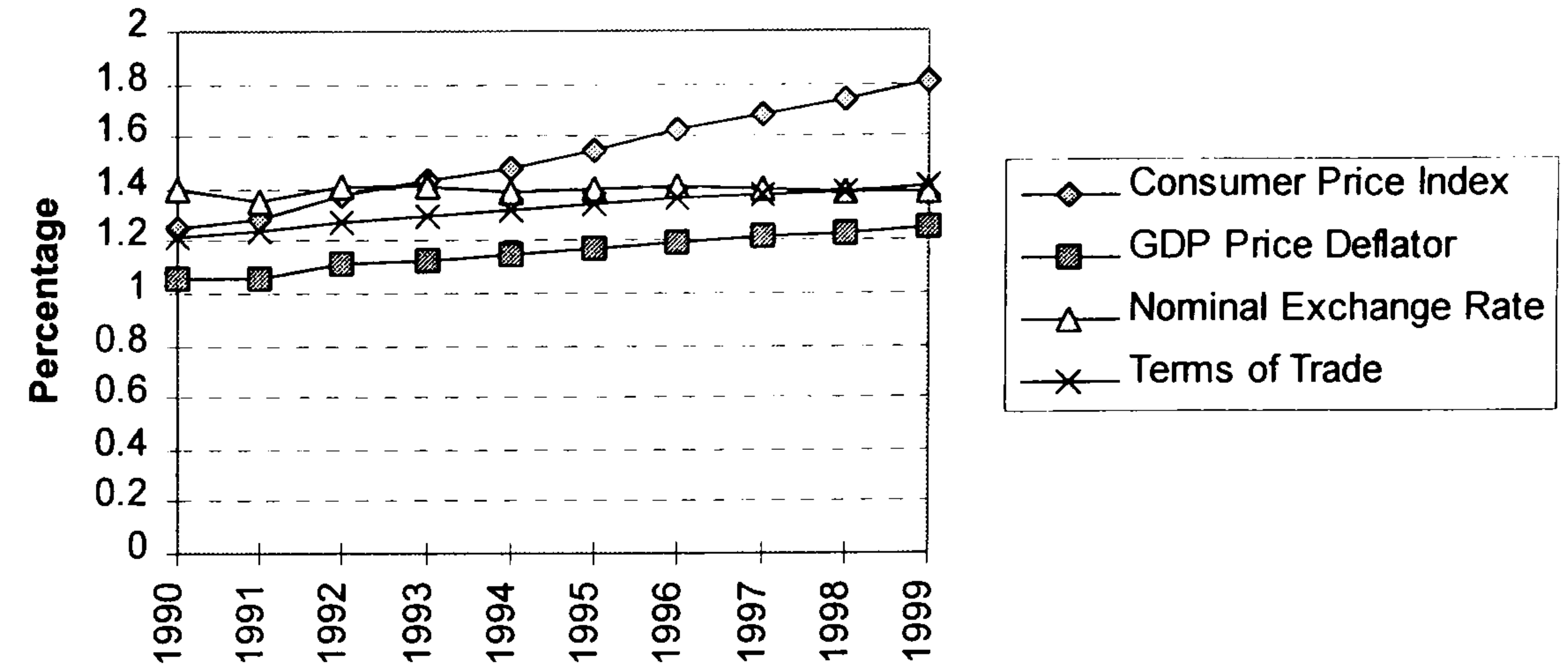


Figure 5.8 BL: Real Wages (In 1983 Prices)

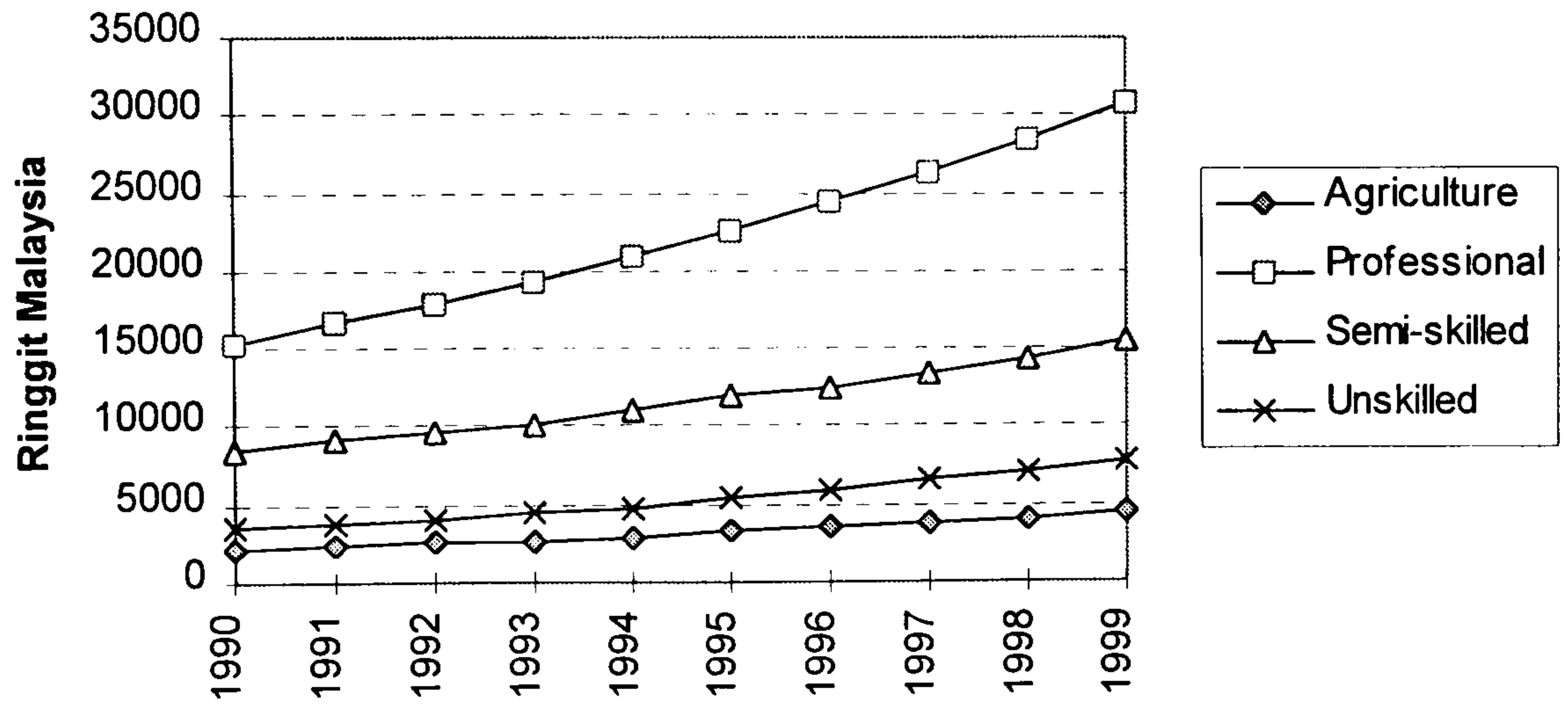
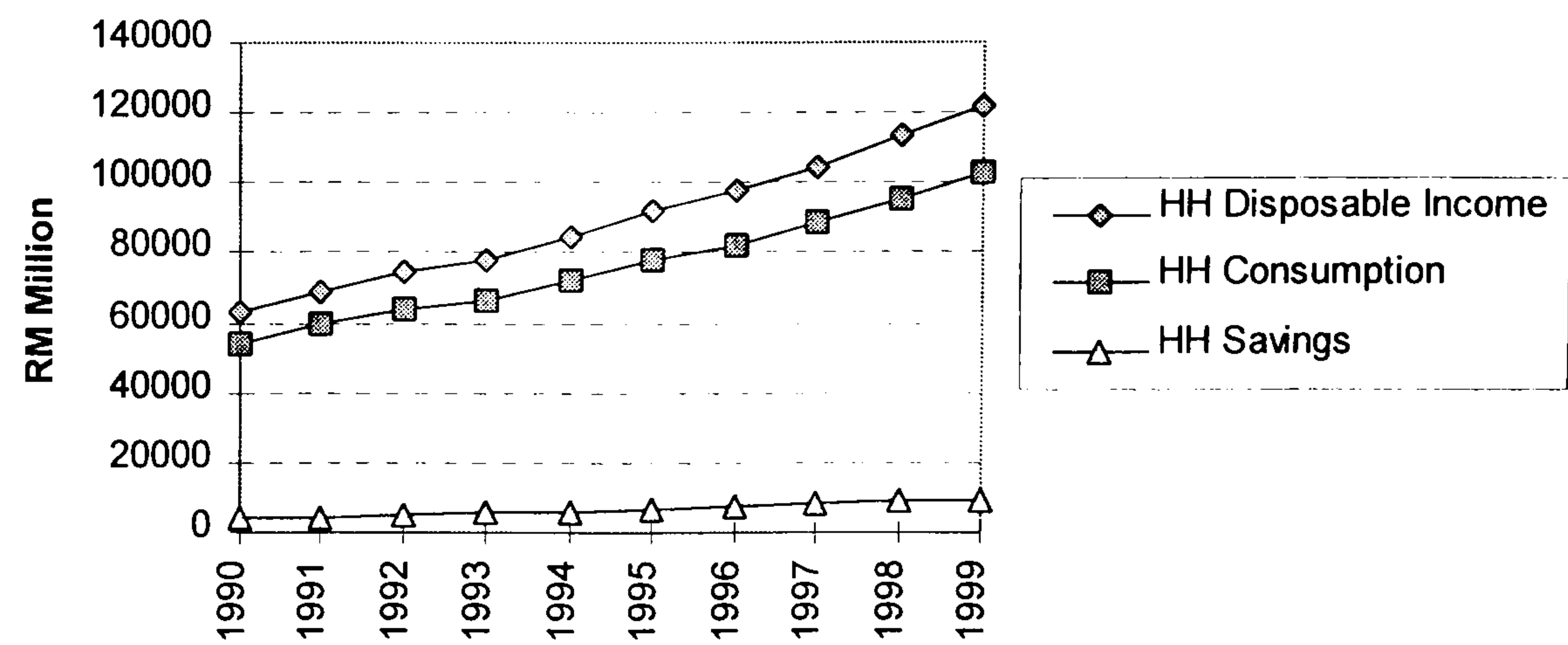


Figure 5.9 BL: Household Aggregates (In 1983 Prices)



are collected. For instance, there are several marginal tax rates in a progressive income tax system, each of which apply to different taxable income categories. Income tax revenue is a function of the marginal tax rates, the exemptions and deductions allowable, the composition of the taxpayers, and the way the tax is administered and collected. It is possible to increase tax revenue by changing the variables, such as improving tax administration or expanding the tax base, without modifying the marginal tax rates. For instance, in the case of corporate taxation, the government can increase tax revenue by reducing the investment tax incentives that are currently extended to particular types of investments, without even changing the corporate tax rate.

Evaluation of simulations. In our evaluation of tax reform simulations, we compare the effect of the tax change against the baseline position in terms of four sets of key economic variables. Although M^4 produces a wide range of output, to facilitate analysis we summarised the results in terms of four charts to capture the salient aspects of each simulation.

1. *Real GDP aggregates.* The first chart shows the changes in real GDP aggregates. The preferred tax change would be one that has the least negative or the most positive effect on GDP, private consumption, government consumption, and total investment.

2. *Aggregate prices.* The second chart shows the effect of the tax change on aggregate price movements. The consumer price index (CPI) and the GDP price deflator indicate the extent of inflation. While the CPI measures the cost of buying a fixed bundle of goods for the consumer, the GDP price deflator is the ratio of nominal GDP in a given year to real GDP. The CPI uses the same basket of goods, which includes imports, from year to year. The GDP price deflator, on the other hand, measures a much wider group of goods and only include those produced domestically. The nominal exchange rate is the effective rate against a bundle of foreign currencies, while the terms of trade shows the relative position of the prices of exports against imports.

3. *Real wages.* The third chart shows the relative wage movements by skills and occupational categories, that is, agricultural workers, professional workers,

semi-skilled workers, and unskilled workers. Agricultural workers and unskilled workers are generally those in the low income groups, while the semi-skilled workers and the professional workers refer to those in the middle and upper income groups, respectively. A divergence in real wage trends between the professional workers and the agricultural workers and unskilled workers shows increasing inequality arising from the tax reform.

4. *Household aggregates*. The fourth chart pertains to real household disposable income, consumption and savings.

Two categories of simulation are performed. The first category is *revenue-enhancing* tax reforms, while the second is *revenue-neutral* tax reforms.

6.1 Revenue-Enhancing Tax Reform Simulations

In our first group of policy experiments, we examine the implications of a 10 percent increase in government revenue above the baseline position for all the years under consideration. Revenue generation is always an important consideration for any government, and revenue enhancement has often been a prime motive for tax reform. If the Malaysian government wishes to increase its tax revenue either to meet increased government expenditure or to reduce its current deficit, the important policy issue is which particular tax or group of taxes could be used for the purpose that would bring least negative effects to the key economic variables. We perform the simulations by increasing the tax rate for each category of taxes in turn while keeping the other taxes unchanged. Since by construction the annual amount of revenue raised from each tax is identical, this provides us with a consistent basis for comparing the relative merits or demerits associated with the tax increase.

6.1.1 Increasing personal income tax (S1)

Very often the analysis of income tax changes is linked to a discussion on work incentives. This issue is discussed at greater length in Chapter 6 and Chapter 7 of the thesis where microeconometric techniques are used to analyse the Malaysian labour force and income data. In this section, however, we confine our analysis to the macroeconomic implications of income tax changes under the assumption that labour supply is unaffected by tax reform.

In the model, income tax is treated as a tax on household labour income net of workers contributions to the Employee Provident Fund. Using M^4 we performed a counterfactual simulation (S1) of increasing income tax in order to generate an extra 10 percent of overall government revenue above the baseline simulation (BL) for each year over the period 1990-99. The results are summarised in Figure 5.10 through Figure 5.13. The most obvious implication of the tax increase is the fall in household disposable income and household consumption by around 5 percent in real terms. The fall in real disposable income is accompanied by a corresponding decrease in real household savings between 20-25 percent over the baseline position. In terms of real wages, there is a relative increase in the wages of unskilled labour and a decline in the wages for other categories of workers.

At the GDP aggregate level, real private consumption falls by 3-5 percent below the baseline estimates. Other than the change in private consumption at the aggregate level, there is very little change in real GDP, government consumption and investment. In M^4 total investment is obtained by summing investment by activity of the private sector, government and the non-financial public enterprises (NFPE). Both NFPE and government investment are exogenous in the model. In terms of price change, the baseline simulation predicts an increase in CPI and GDP price deflator ranging between 1.0-1.8 percent throughout the decade. In this simulation, the changes in CPI and GDP price deflator are generally much slower than the baseline simulation. There is a relatively higher appreciation of the nominal exchange rate during the early part of the decade followed by a slight decline in the second half of the decade.

Figure 5.10 S1: GDP Aggregates (In 1983 Prices)

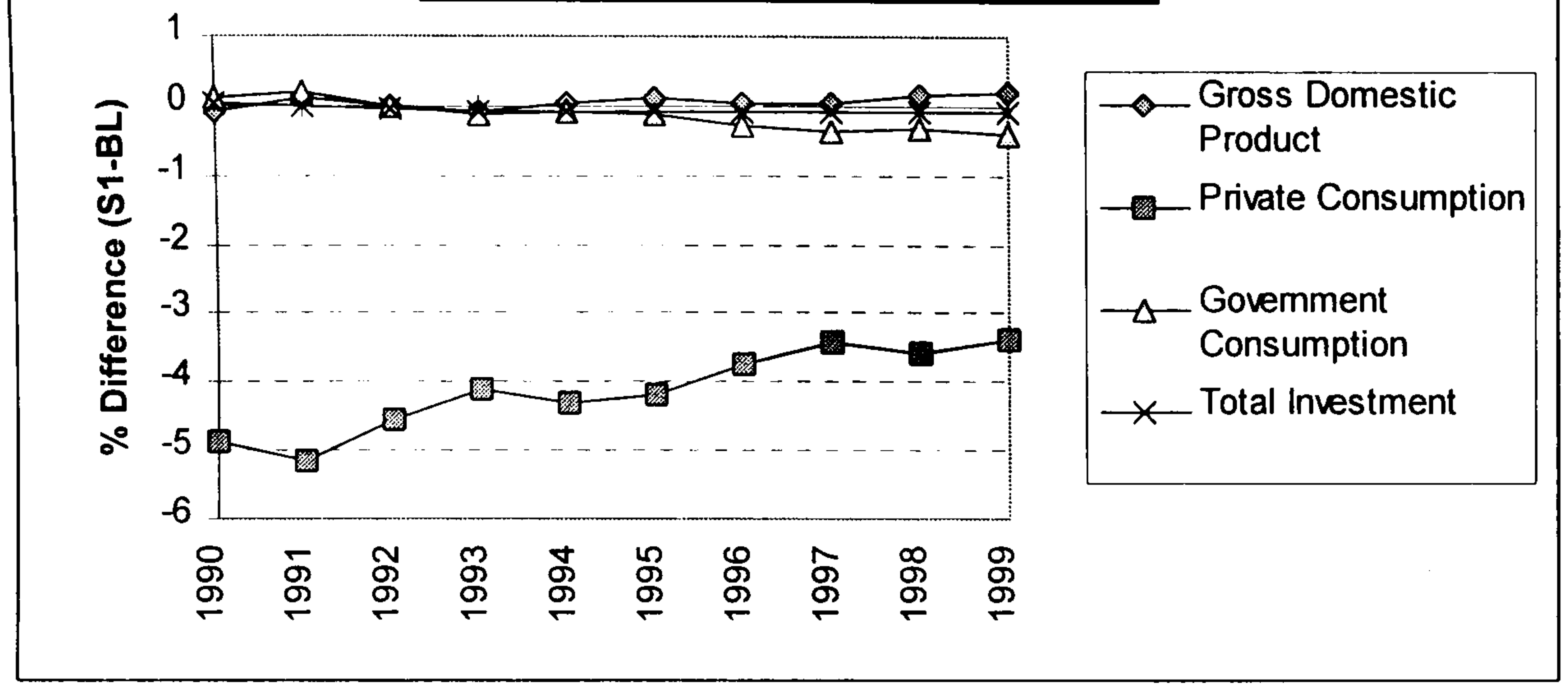


Figure 5.11 S1: Aggregate Prices

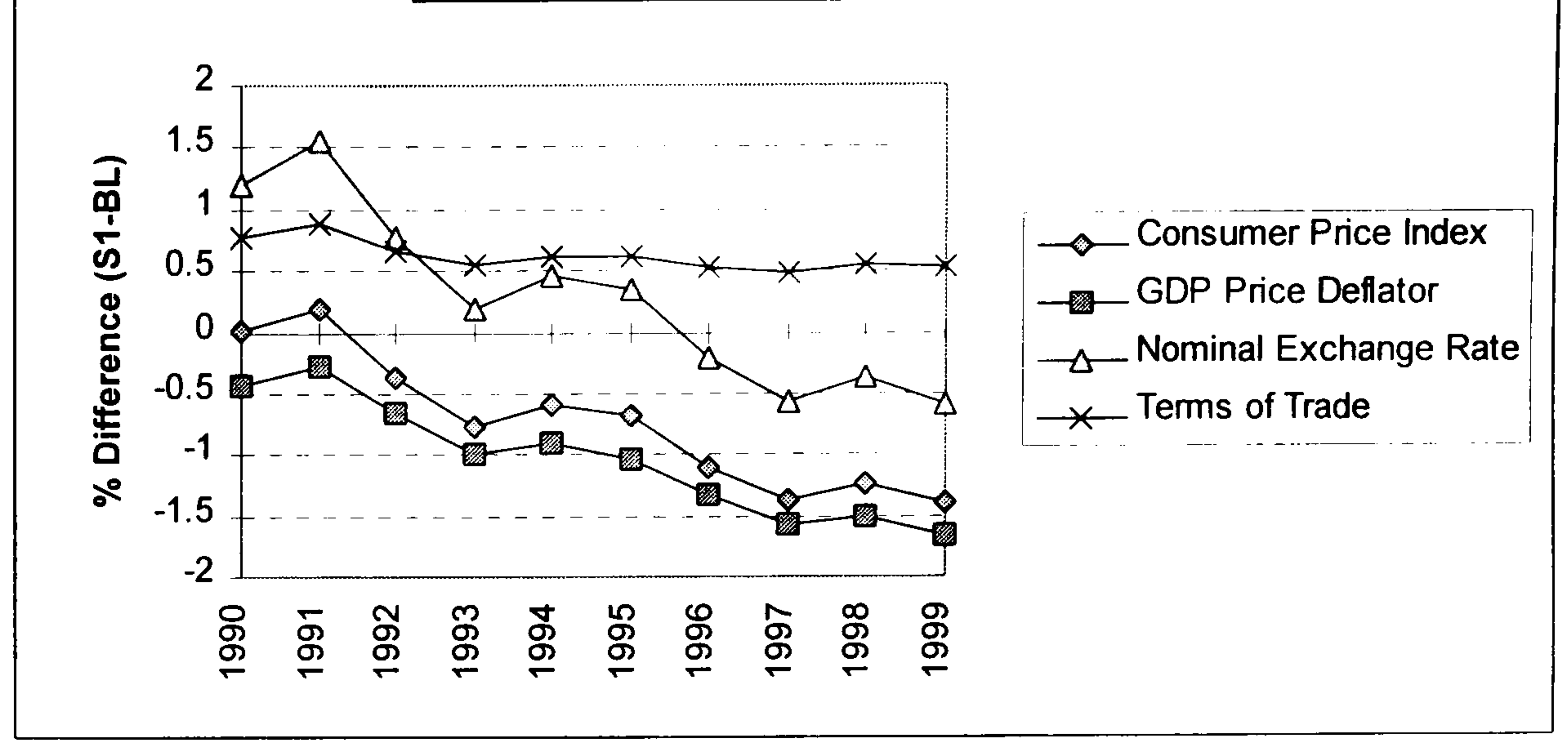


Figure 5.12 S1: Real Wages (In 1983 Prices)

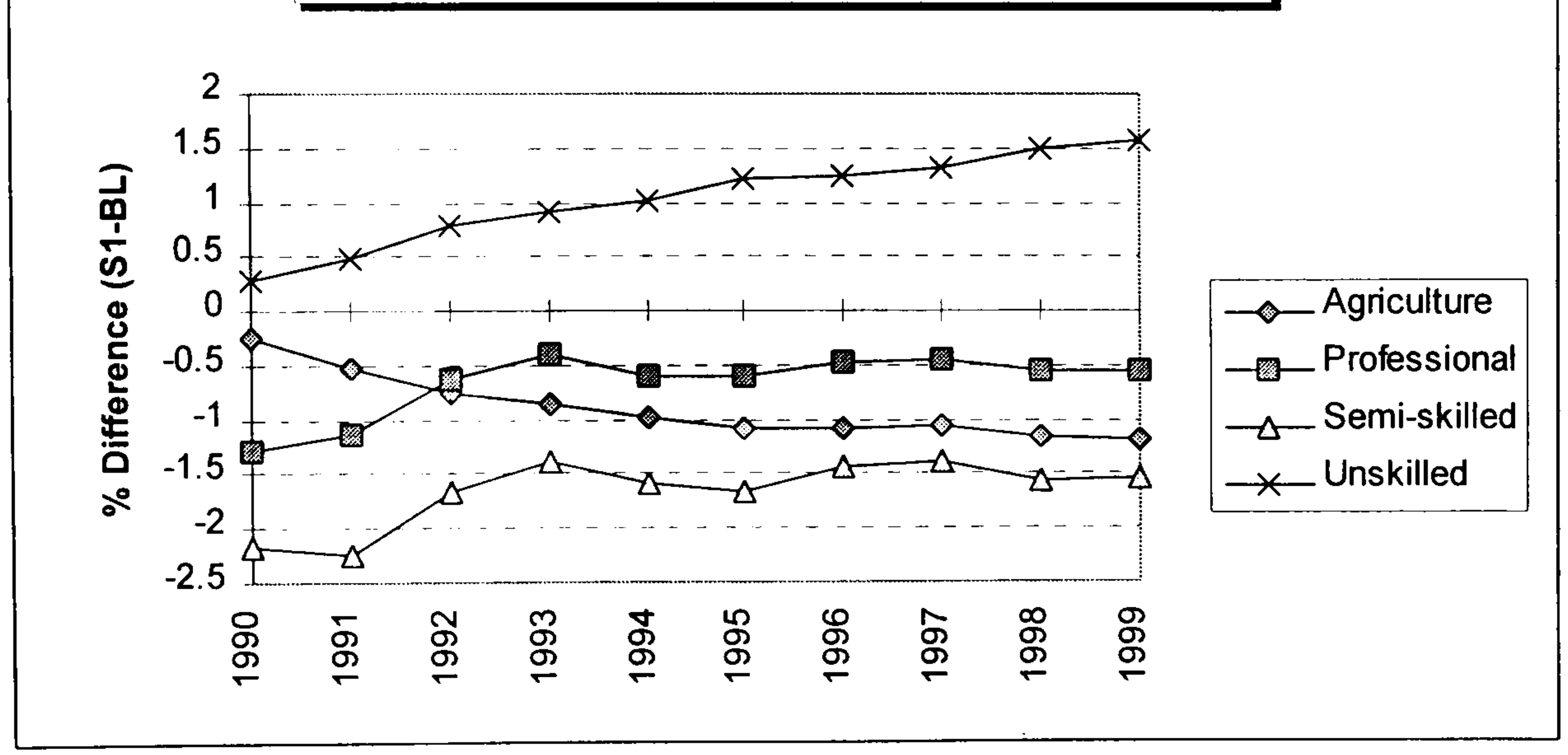
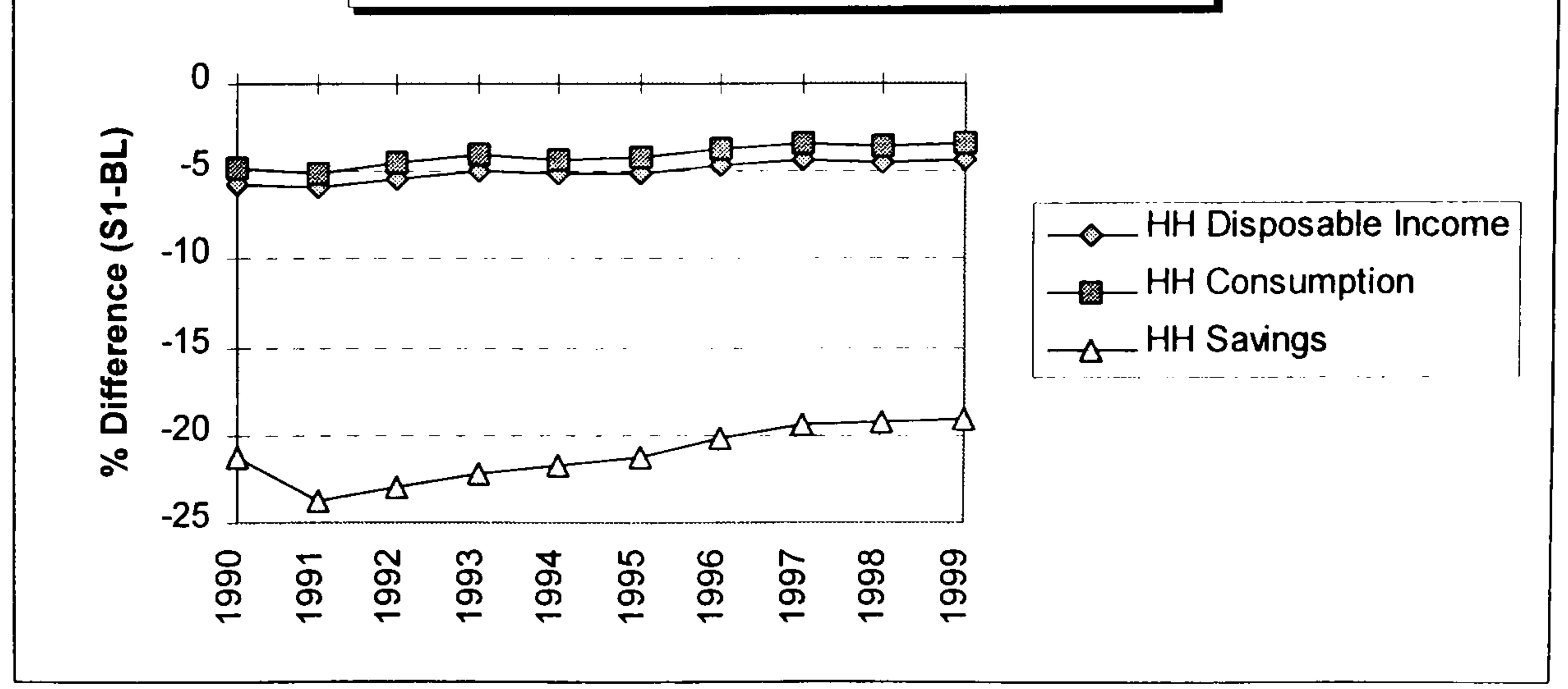


Figure 5.13 S1: Household Aggregates (In 1983 Prices)



6.1.2 Increasing corporate income tax (S2)

As discussed in Atkinson and Stiglitz (1980), the issues connected with the effects of corporate income tax are more complex than is often assumed in econometric studies. Corporation tax can take several forms and it depends on, among other things, the tax deductibility of interest payments and the depreciation provisions. Tax policy affects the capital structure of the firm and, accordingly, the marginal cost of capital. According to theory, as a result of corporate profits tax the cost of capital will rise and cause the firm to adopt less capital-intensive technique at any level of output and to switch from corporate to the non-corporate sector in their demand for factors. Hall and Jogenson (1967) undertook an investigation of taxation and investment. They showed that the adoption of accelerated depreciation allowances in the United States following the 1954 legislation reduced the cost of capital by 9 percent and accounted for a substantial increase in investment. A cut in corporation tax from 52 to 48 percent in 1964 is estimated to have increased the cost of capital by 1 percent[21] and caused a small reduction of investment. However, the results are still not firmly established because of the considerable difficulties in making the transition from the theoretical model to the empirical work. Corporate profits tax is also linked to the choice of factor intensity as well as relative output demand in the corporate/non-corporate sectors. In addition, studies have been conducted on the general equilibrium effects of investment tax credits against corporate tax changes for promoting investments in developing countries.[22]

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[17] Total government receipts are equal to the sum of its direct and indirect taxes, plus exogenous transfers from the rest of the world plus the interest income that the government enjoys on claims it holds against financial institutions.

[18] There are two categories of government expenditure in Malaysia, namely, 'operating expenditure' and 'development expenditure'. *Operating expenditure*, which falls under the purview of Treasury, is allocated as part of the annual budgetary exercise for the running of government, as well as other expenses borne by the government. In the model, government operating expenditure is defined as the sum of its current account expenditures on goods and services plus the sum of its transfers to other domestic institutions and to residents in the rest of the world. Transfers include service payments on government debt. *Development expenditure* is made for new government investments and is allocated under the five-year Malaysia Plans, with provisions for a mid-term assessment. This fund is controlled by the Economic Planning Unit.

[19] In M^4 the Government sector is narrower in scope than the 'Public Sector'. The Non-Financial Public Enterprises are separately identified in the model.

[20] Government current surplus is defined as the difference between current account receipts and expenditures. Government financial surplus/deficit is obtained from subtracting the nominal value of government investment (or 'Development Expenditure') from government current surplus.

[21] It is argued that this is the result of the depreciation provisions being in excess of true economic depreciation.

[22] See Feltenstein and Shah (1993) for Pakistan and Feltenstein and Shah (1995) for Mexico.

In our simulation, we do not attempt to go into the detailed intricacies of corporate taxation. For Malaysia this would require a model that allows for depreciation allowances, industrial incentives and investment tax credits. In addition, it is not possible to specify in M^4 how the increase in corporate tax revenue is to be accomplished: whether through an increase of corporate tax rate, a reduction of tax incentives and allowances, or a combination of both. Each of these alternatives would presumably have different effects on the economy. Despite this limitation, we have opted for a more modest aim of using the model to examine the general macroeconomic effects of increasing corporate tax revenue against the baseline simulation. It should be recalled that for the purpose of our simulation, corporate tax revenue includes the contribution from petroleum tax.

In the model, corporate income is the sum of its factor income (profits), its dividend income and transfer receipts from the rest of the world, interest from financial corporations, dividends from NFPEs and transfers from Government. From their income, business companies distribute dividends to households, to financial corporations, and to residents of the rest of the world. They also pay interest on loans to financial corporations, which are calculated gross of margins. In the computation of total disbursements, some allowance is made for exogenous transfers of corporations to the rest of the world. The total taxes paid by business corporations are split into corporate and other taxes. In the absence of any other information, the model assumed that corporate depreciation allowances qualifying for tax relief constitute 10 percent on nominal private investment in the current period.

From the results of the simulation, it appears that the effect of increasing corporate taxation has only minor favourable effects on our selected indicators (see Figures 5.14-5.17). Real GDP and real private consumption are higher than the baseline estimate, while total investment is slightly lower. All the changes are less than 0.5 percent from the base position. Although aggregate prices are higher than the baseline simulation at the start of the decade, the difference between the two simulations becomes narrower by the middle of the decade. After 1996, the aggregate prices of Simulation 2 are expected to change slower than the base. On household aggregates, real household

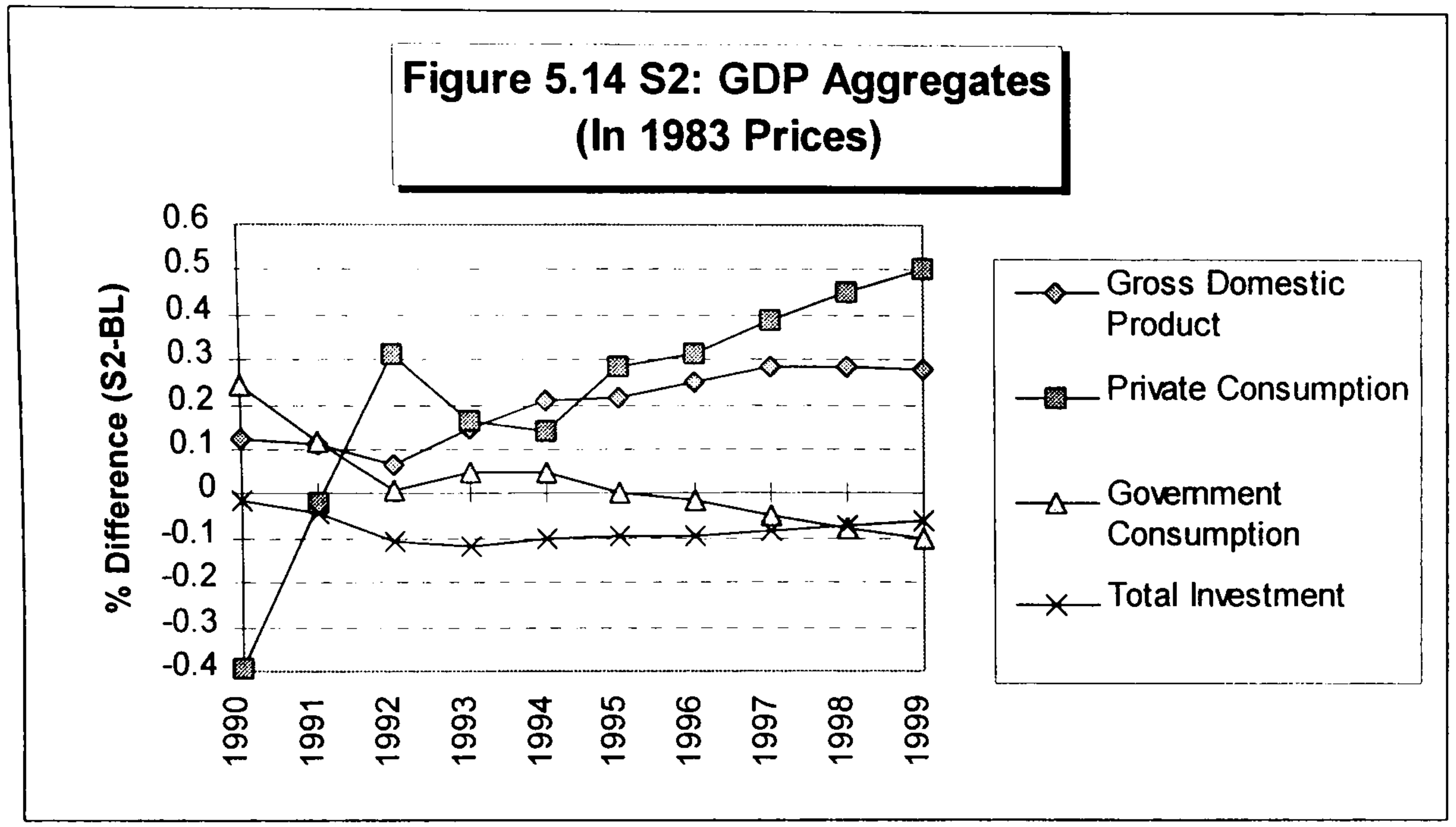


Figure 5.14 S2: GDP Aggregates (In 1983 Prices)
% Difference (S2-BL)
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Gross Domestic Product
Private Consumption
Government Consumption
Total Investment

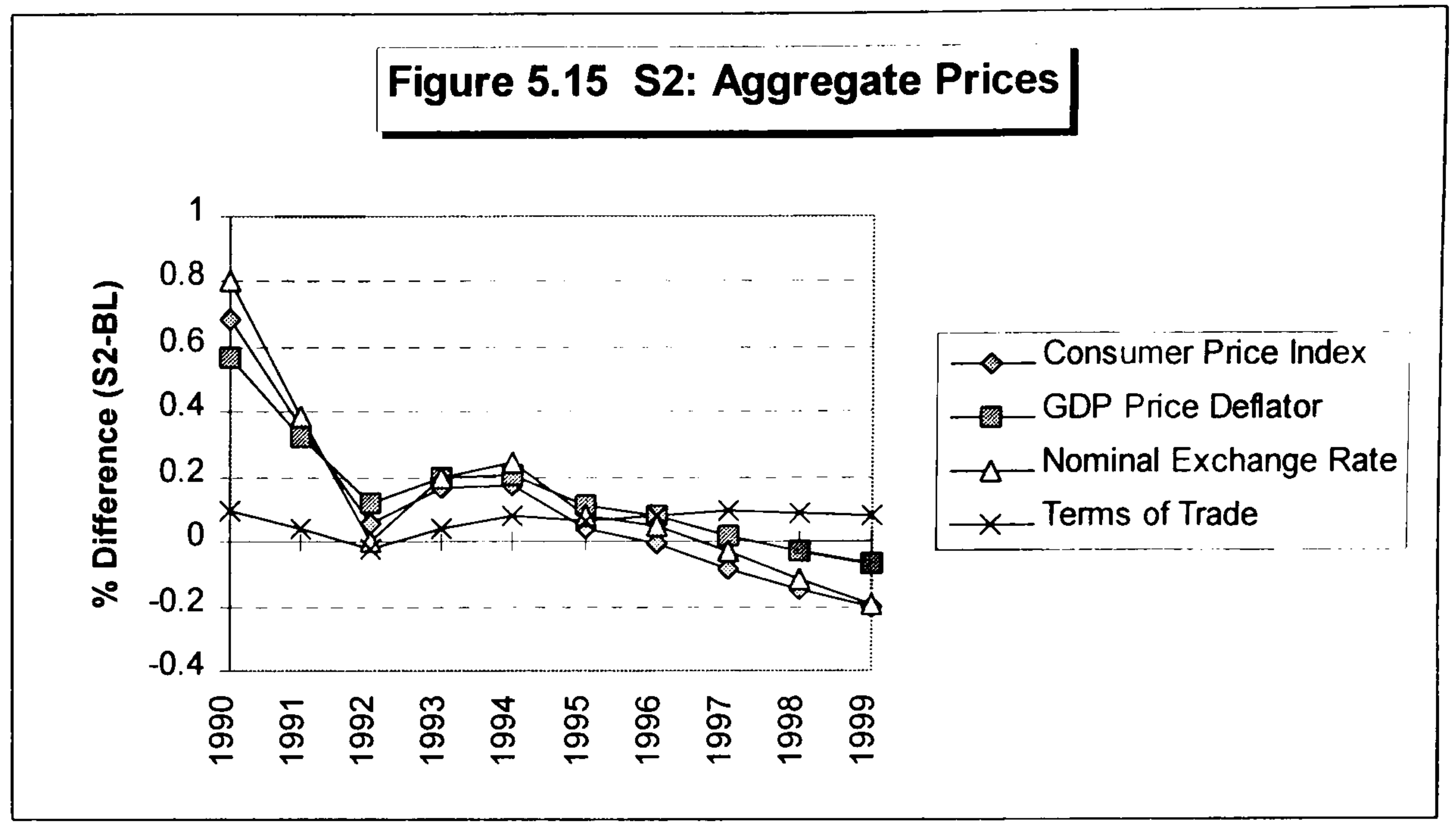


Figure 5.15 S2: Aggregate Prices
% Difference (S2-BL)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Consumer Price Index
GDP Price Deflator
Nominal Exchange Rate
Terms of Trade

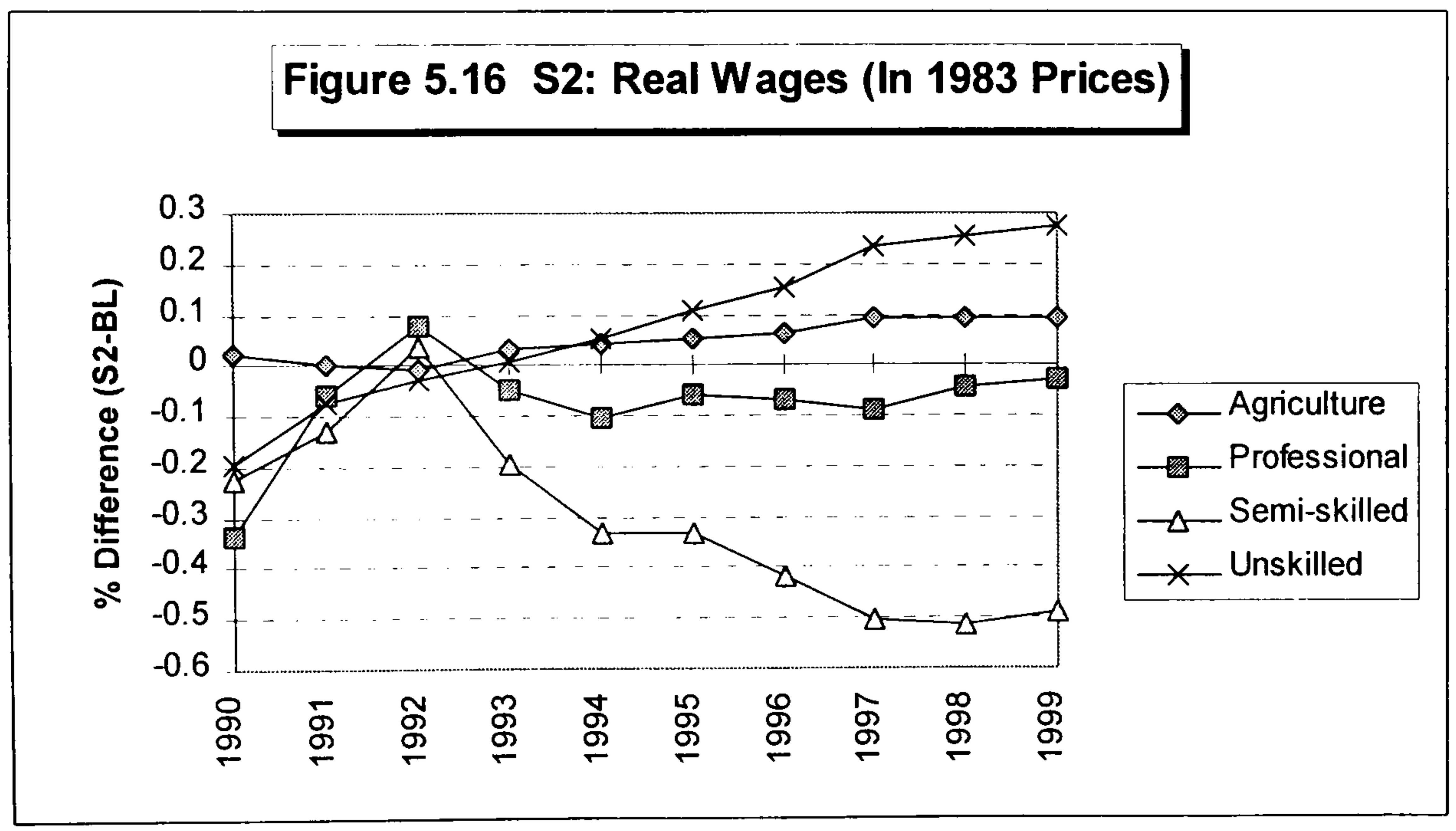


Figure 5.16 S2: Real Wages (In 1983 Prices)
% Difference (S2-BL)
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Agriculture
Professional
Semi-skilled
Unskilled

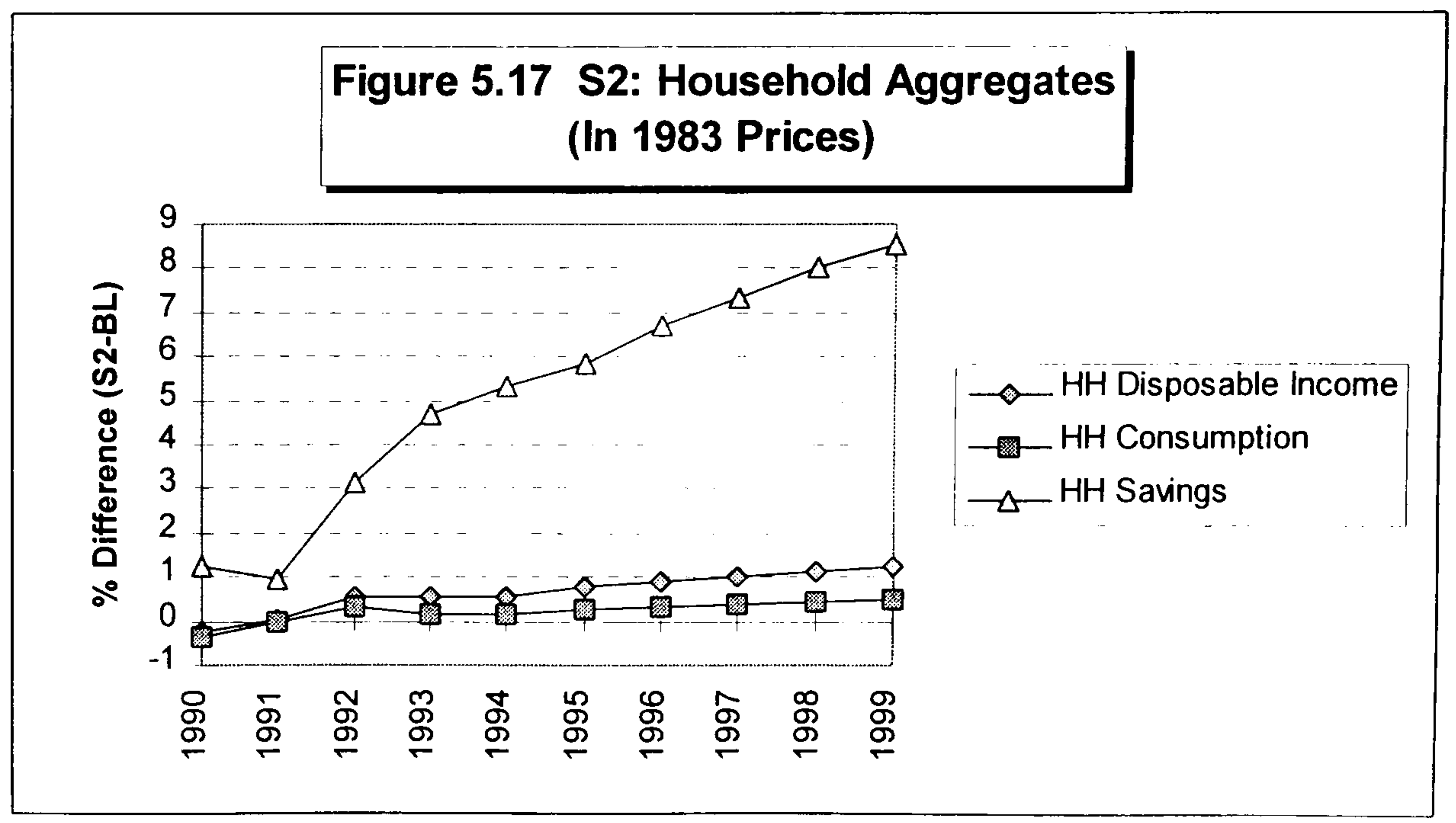


Figure 5.17 S2: Household Aggregates (In 1983 Prices)
% Difference (S2-BL)
9
8
7
6
5
4
3
2
1
0
-1
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
HH Disposable Income
HH Consumption
HH Savings

disposable income and consumption are expected to rise to 1 percent of the baseline estimates. Real household savings rise to around 9 percent above the base by the end of the decade. There is a slight improvement in real wages for agricultural workers and unskilled workers and a worsening in the wages of professional workers and especially semi-skilled workers.

6.1.3 Increasing export taxes (S3)

The contribution of export taxes to total tax revenue has been declining over the years. The taxes are levied on primary commodities based on *ad valorem* rates and on the excess of export prices over some notional cost of production. In the model, export taxes are calculated by multiplying the *ad valorem* tax rates by the appropriate nominal flows and then summing over all transactions on which export taxes are levied.

Simulation S3 is based on the assumption that the export tax rates are raised to increase government revenue by 10 percent above the base simulation. The results of the S3 compared with the baseline (BL) are shown in Figures 5.18-5.21. This simulation results in a relative decline in real GDP of up to 0.5 percent of the base, and a sharper decline in private consumption. The rise in export taxes leaves total investment unchanged. In terms of the effect on aggregate prices, the GDP price deflator is higher than the base by 2-3 percent, while the CPI remains unchanged during the initial years but increasing up to 2 percent by the end of the decade. This is accompanied by an appreciation in the nominal exchange rate and a worsening of the terms of trade.

Household disposable income and consumption are initially lower than the base simulation by 1 percent and gradually falling to 4 percent by the end of the decade. Real household savings are expected to record a steeper decline from 2 percent below the baseline position in 1990 to around 13 percent in 1999. Increasing export taxes have a negative effect on the real wages of professional, semi-skilled and unskilled workers. Wages of agricultural workers seem to be least affected by the tax increase. This may appear rather surprising since the traditional argument for lowering export taxes is to reduce the regressive effects of the tax on the income of primary producers. However, it is because of the regressive nature of the tax on poor households engaged in primary commodities production that many of the export taxes have either been reduced or removed during the late 1980s. By 1990 over 97 percent of export taxes collected were

Figure 5.18 S3: GDP Aggregtes (In 1983 Prices)

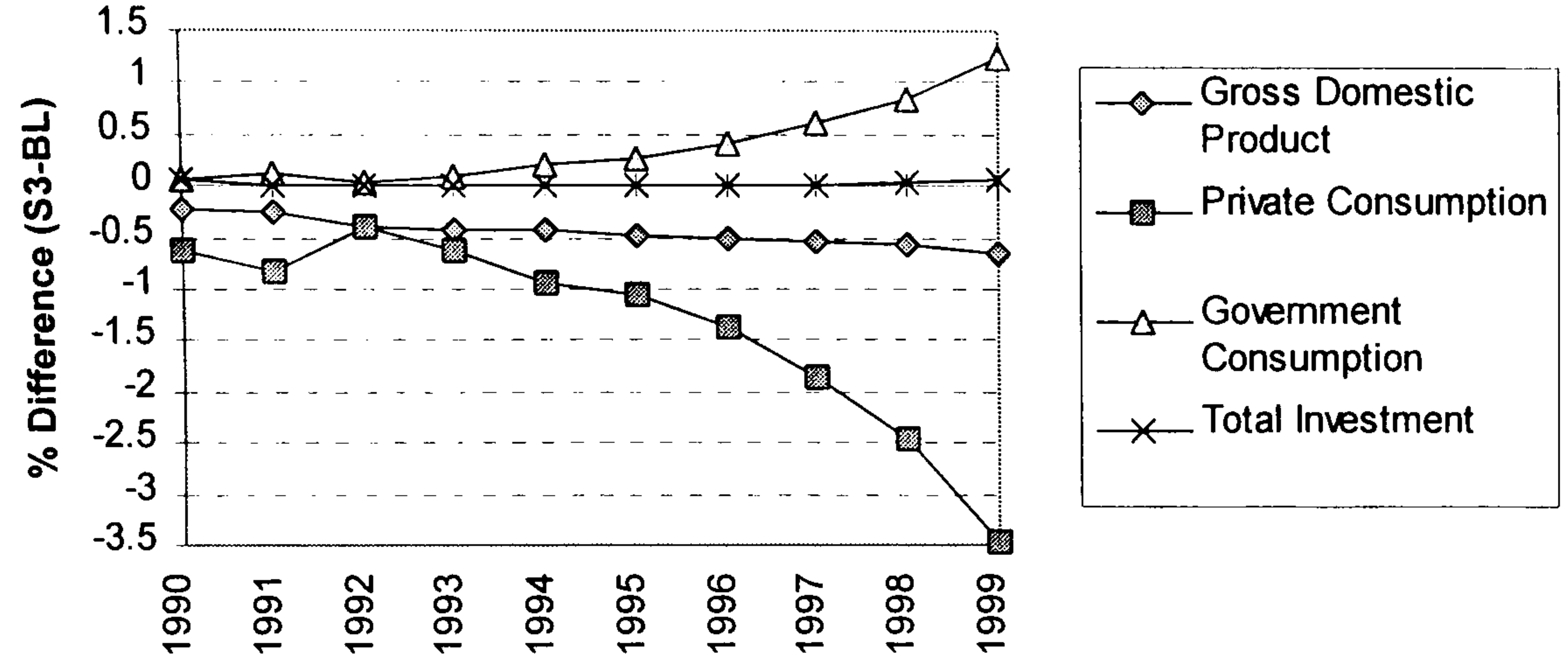


Figure 5.19 S3: Aggregate Prices

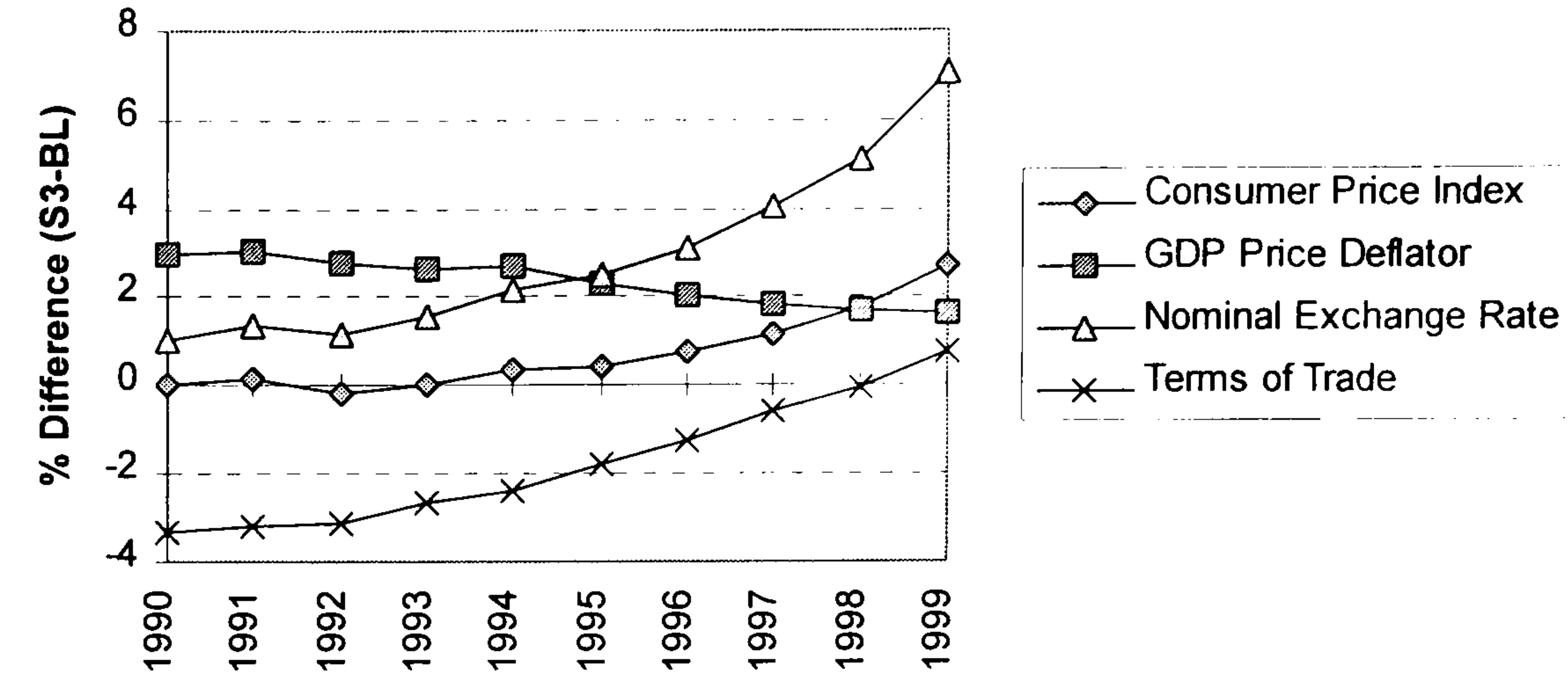


Figure 5.20 S3: Real Wages (1983 Prices)

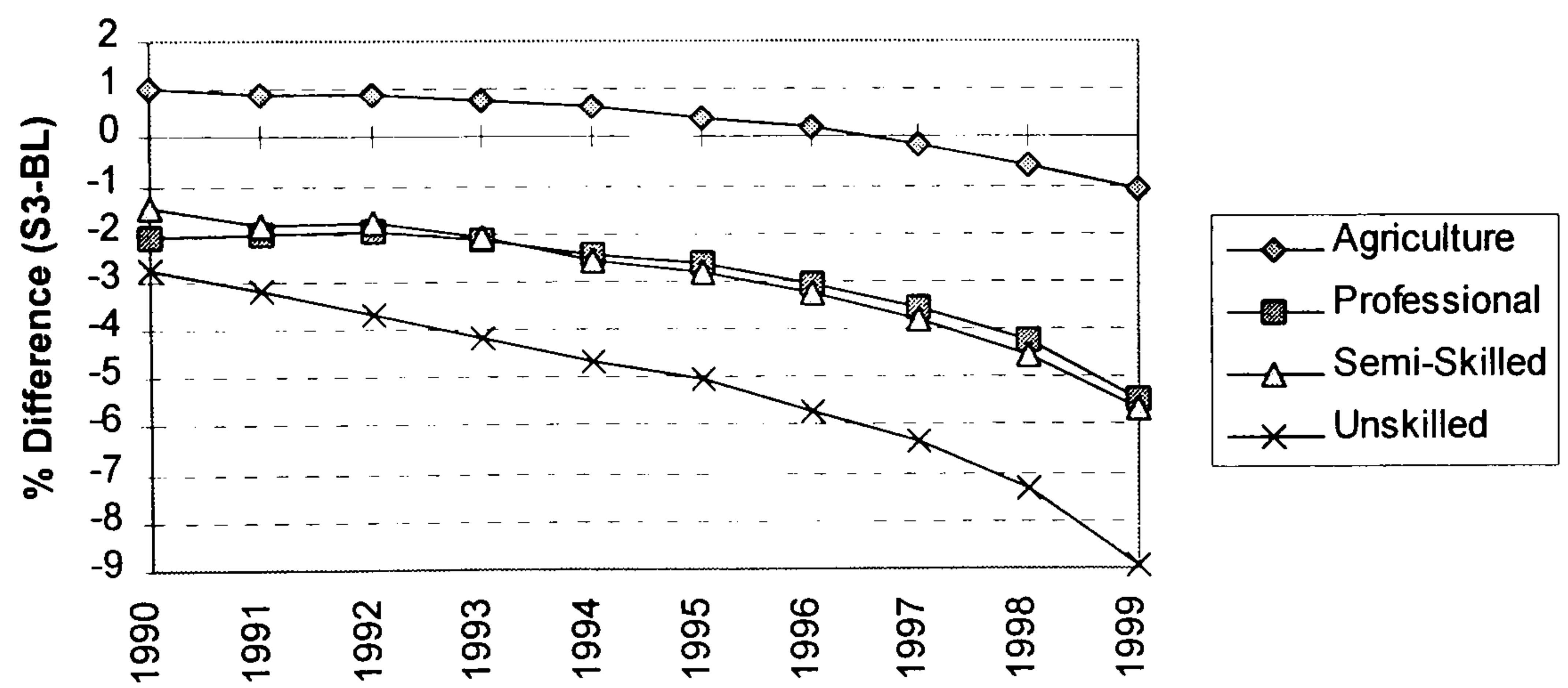
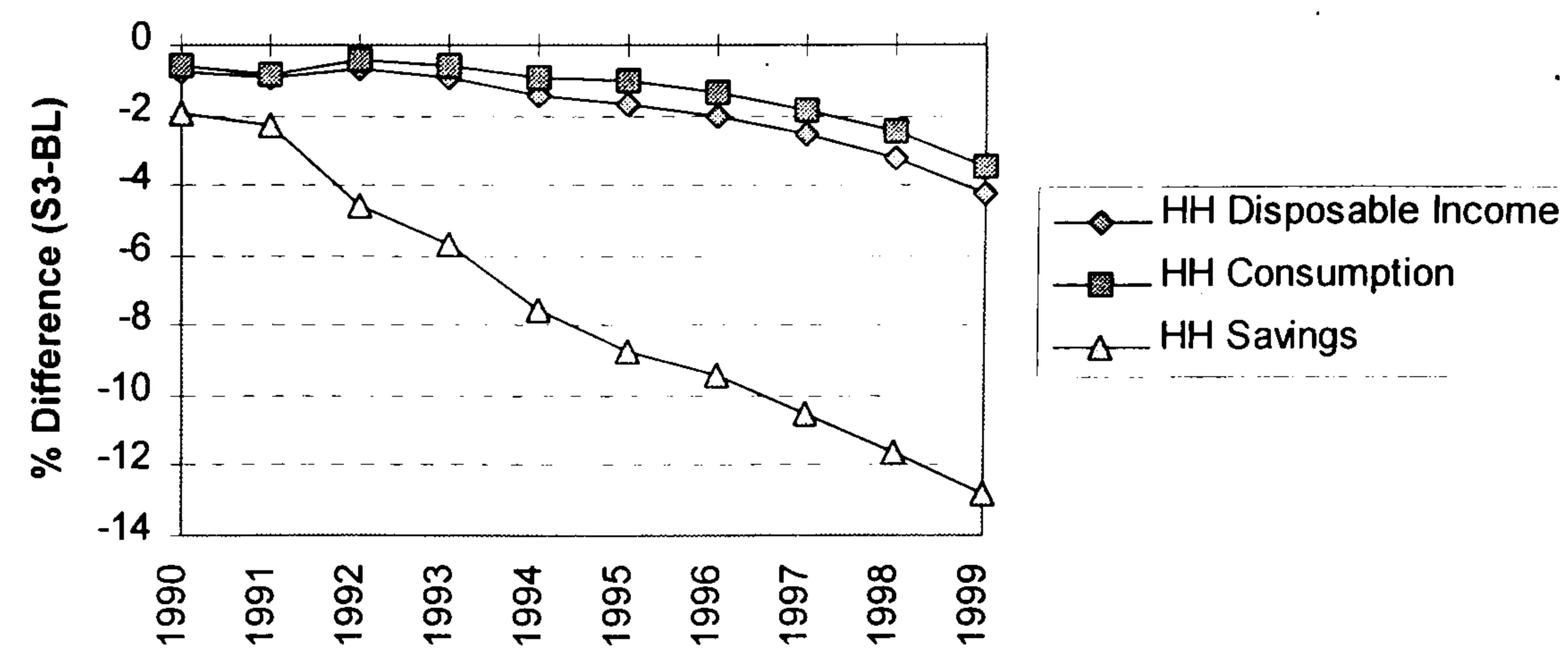


Figure 5.21 S3: Household Aggregates (In 1983 Prices)



derived from petroleum export, while the export taxes from rubber, tin and palm oil were negligible.

6.1.4 Increasing import taxes (S4)

Import duties are levied on a wide range of imports. Most goods are charged rates between 10-35 percent. There is an additional surcharge of 2 percent for raw materials and some machinery and 5 percent surcharge for other goods. The most important source of import duty revenue comes from petroleum and fuel oil. Tax exemptions are given to imports used by government and public enterprises as well as certain types of investments.[13] Import taxes are calculated in the model by applying *ad valorem* tax rates to the appropriate nominal flows and then summing over all transactions of imports for intermediate, consumption and capital uses. Many CGE studies of the effects of trade liberalisation use classical models in which all factors, including physical capital, are freely mobile between sectors. In addition, commodity and factor markets are assumed to be perfectly competitive. The results of these studies suggest that there are welfare gains, though small, in liberalising trade.

Figures 5.22-5.25 show the results of the simulation for import taxes (S4) compared with the baseline simulation. The model predicts that with an increase of import taxes, there is relative decline in real GDP and real government consumption between 0.5-1.0 percent. The decline in real private consumption is larger, between 3.0-4.5 percent. There is also an increase in consumer prices and GDP price deflator up to 1997 and a depreciation in the nominal exchange rate of 1-2 percent. There is no change for the terms of trade.

[24] The MIER Tax Reform Group (1988) proposes that the current import system could be strengthened by abolishing exemptions from import duties granted to government departments and public enterprises and introducing a near uniform rate for most products.

Figure 5.22 S4: GDP Aggregates (In 1983 Prices)

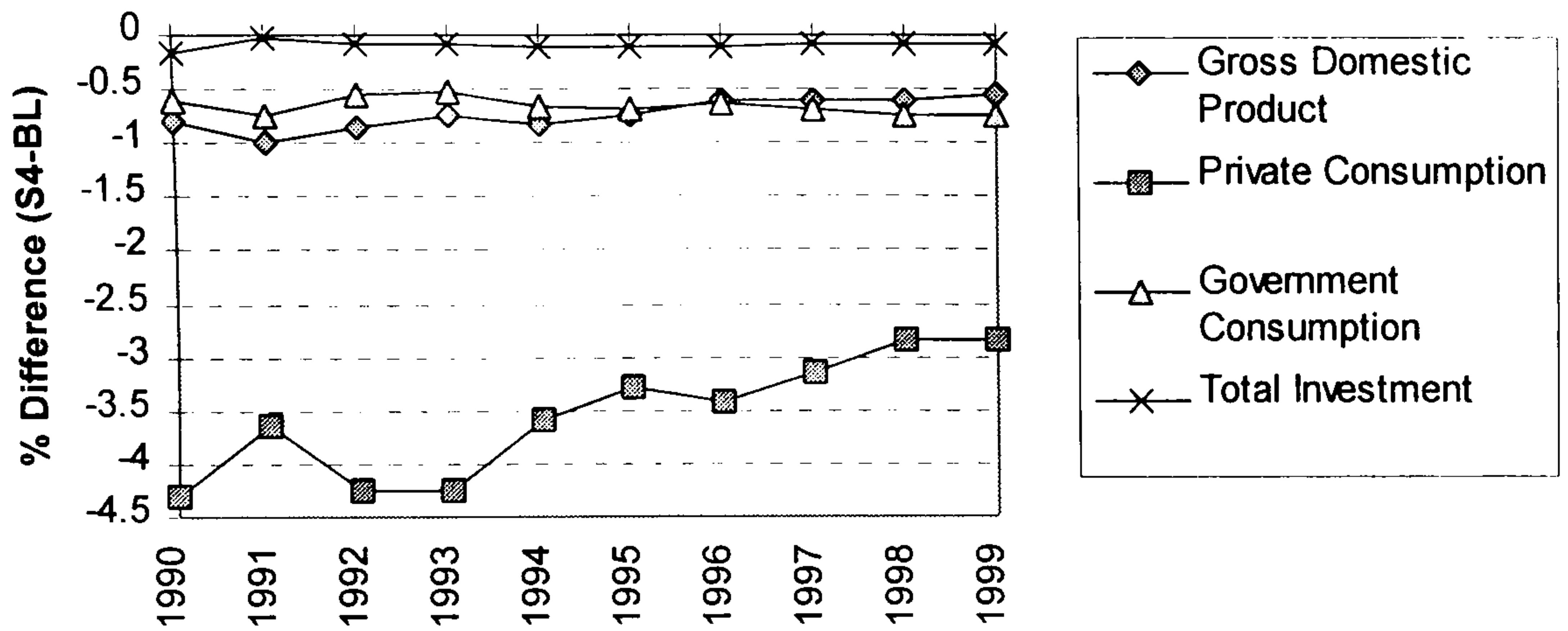


Figure 5.23 S4: Aggregate Prices

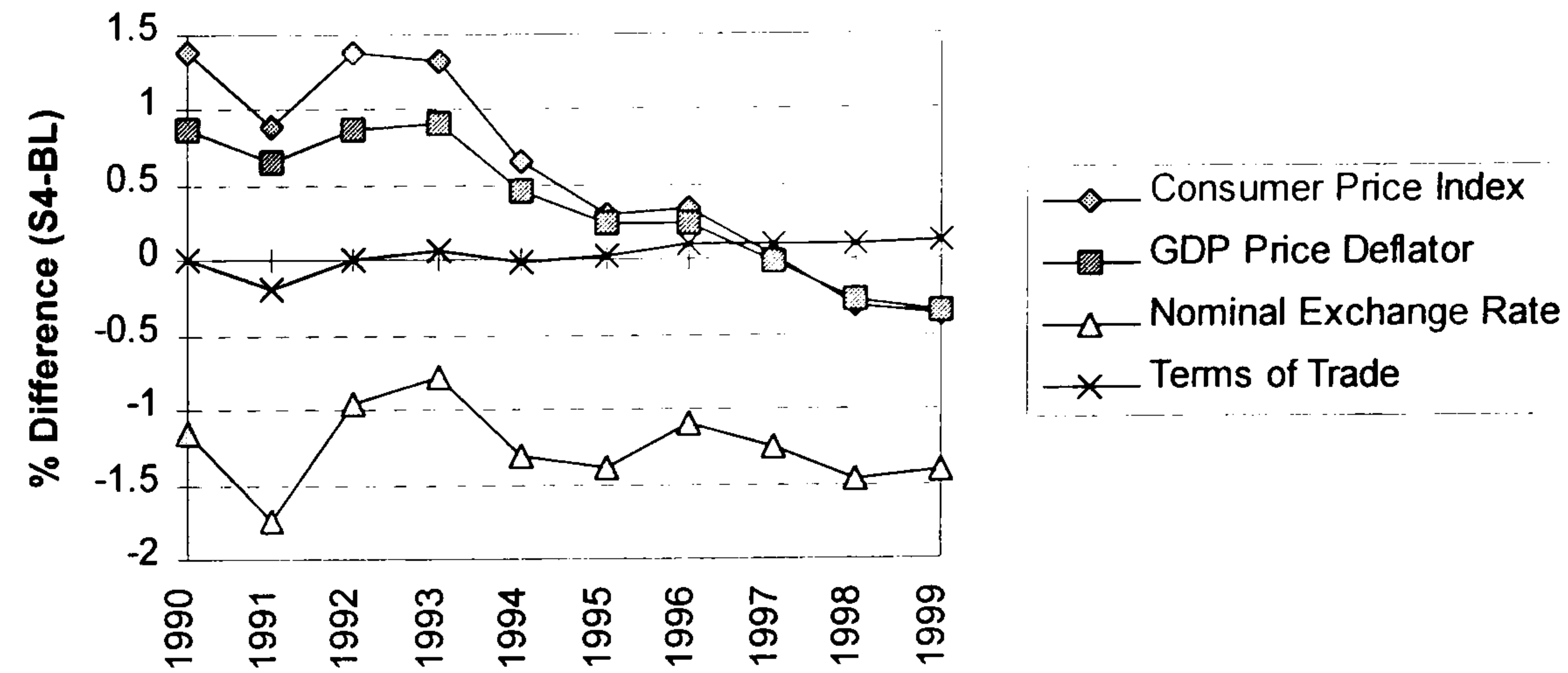


Figure 5.24 S4: Real Wages (In 1983 Prices)

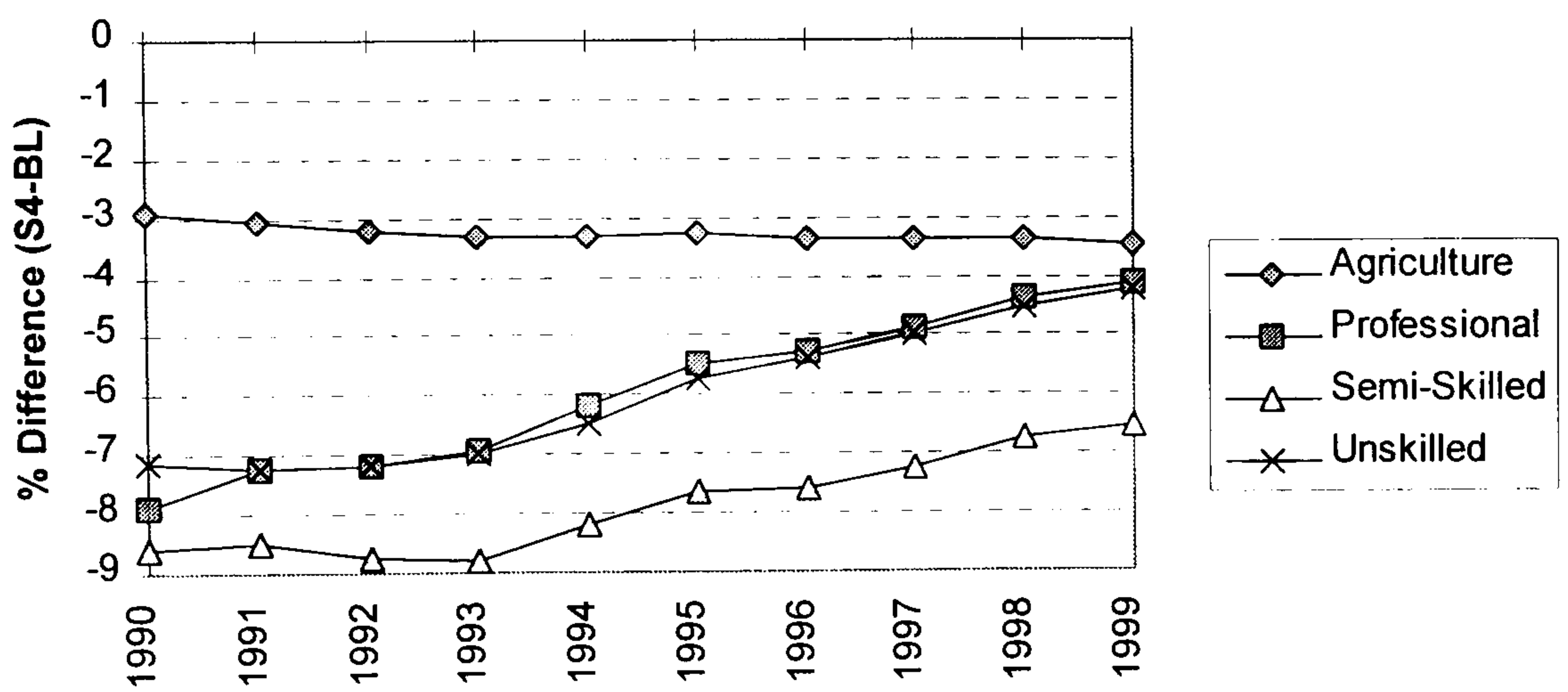
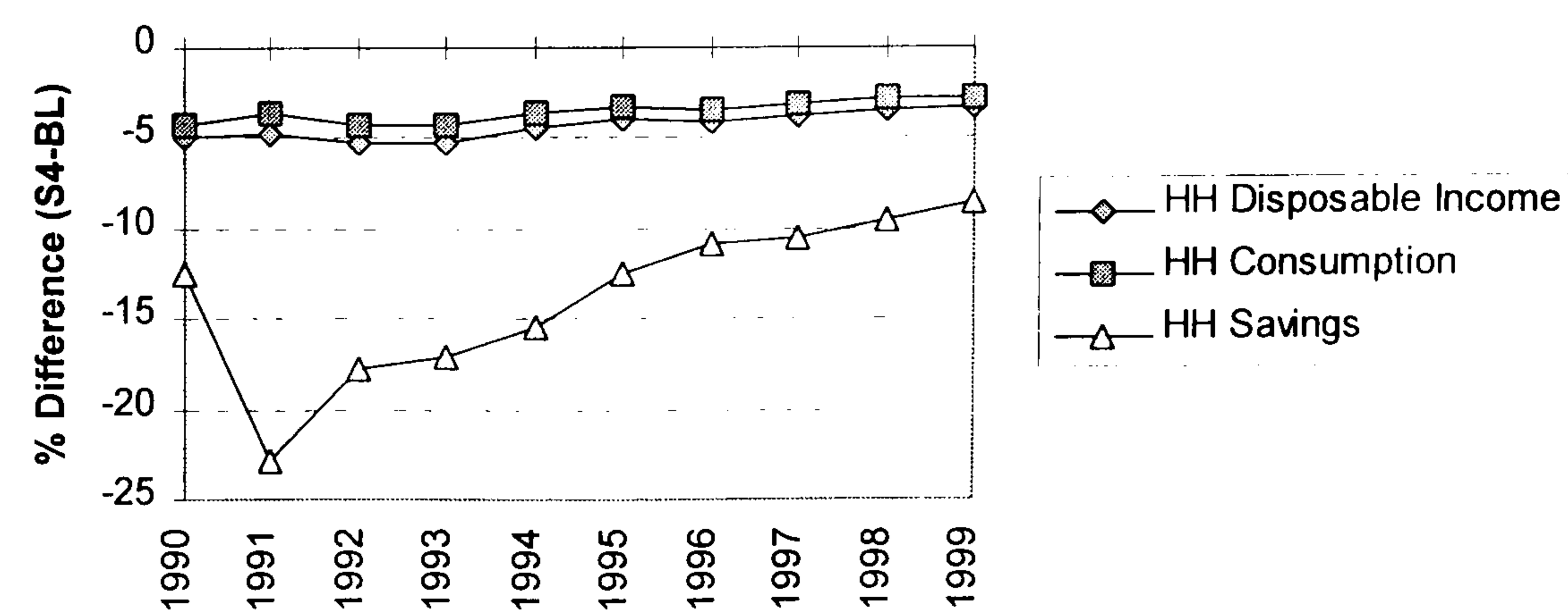


Figure 5.25 S4: Household Aggregates (In 1983 Prices)



Simulation 4 predicts that there will be a decline in real household disposable income and real household consumption of 3-5 percent compared with the baseline position. The simulation output shows that both the import and export volumes are lower than the baseline simulation, which suggests a lesser degree of openness of the economy. The demand for imports falls as a result of lower disposable income among consumers. The model also predicts a slight decrease in exports that is stimulated by the appreciation of the real effective exchange rate. GDP, government consumption and total investment in real terms are all expected to show a slight decrease of less than 0.1 percent. In other words, the change in the tariff regime is not expected to have any significant effect on aggregate output. Although a rise in the import tax rate should generate a negative effect on the economy arising from more expensive products and intermediate goods, the effect is subdued because of the low substitution elasticities adopted in the model. Physical capital is not freely mobile in M^4. The re-allocation of capital to its most productive uses can only be brought about through new investment, thereby contributing to some degree of inertia in the model.

6.1.5 Increasing domestic indirect taxes (S5)

This category of tax captures the other indirect taxes, such as excise duties, sales tax, service tax, and the other indirect taxes. Excise duties are collected by the Customs and Excise Department from licensed factories that produce excisable goods. The duties are imposed when the product moves through the gate that is monitored by a customs officer. Excise duties are levied on products for domestic consumption and not on exports. Over 75 percent of the excise revenue are derived from fuel oils, petroleum products and vehicles, and about 30 percent from alcoholic and soft drinks, and cigarettes. Sales tax contributes a growing share to tax revenue in recent years. It is levied on manufacturing activity and excludes retail trade. Only the larger manufacturers are subject to sales tax. Licensed manufacturers are entitled to claim tax credit on sale of products to other manufacturers in the 'ring system'. Service tax is imposed on certain services, such as lodging, entertainment, body services and other services. Other indirect taxes are road tax and stamp duties. As with the case of export and import taxes, the model calculates domestic indirect taxes by applying *ad valorem* tax rates on the appropriate nominal flows.

Figure 5.26 S5: GDP Aggregates (In 1983 Prices)

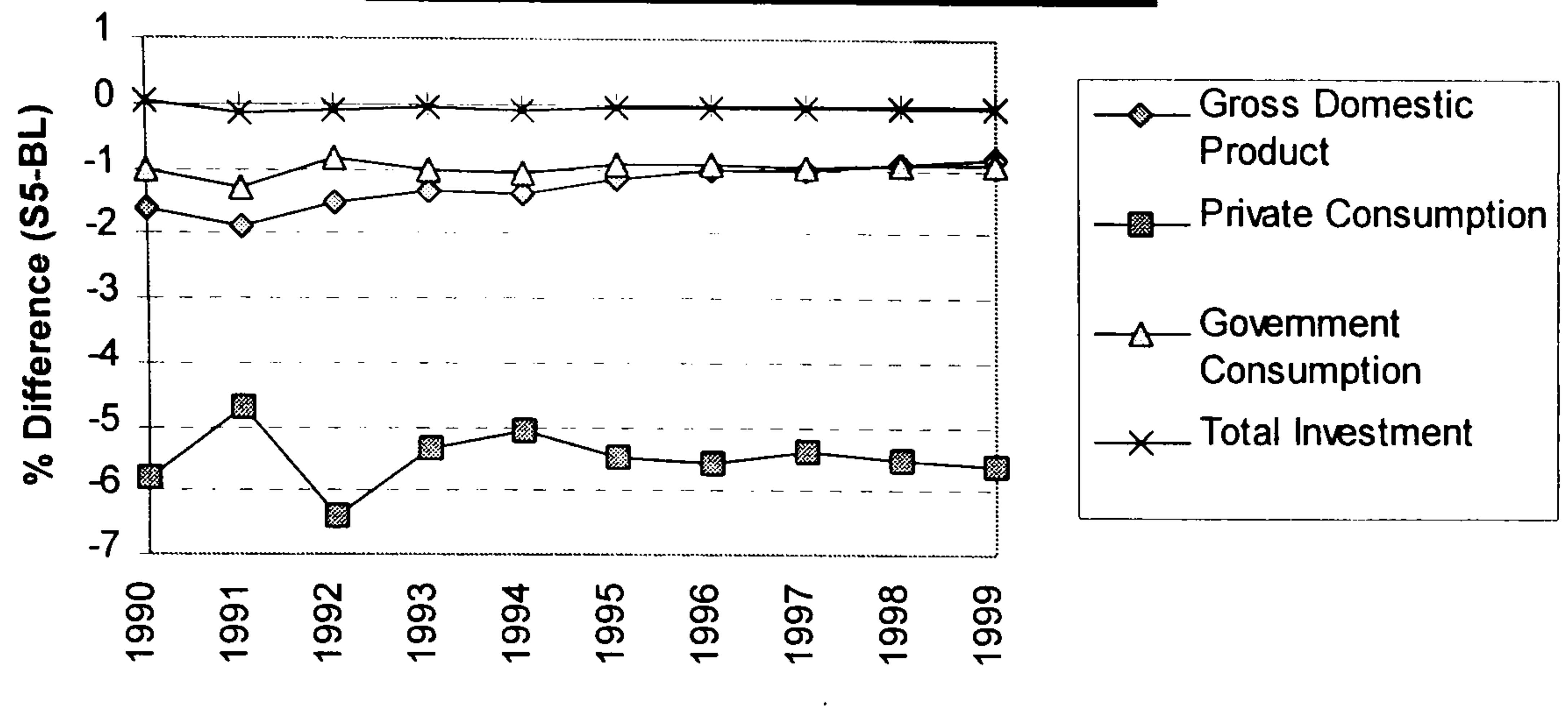


Figure 5.27 S5: Aggregate Prices

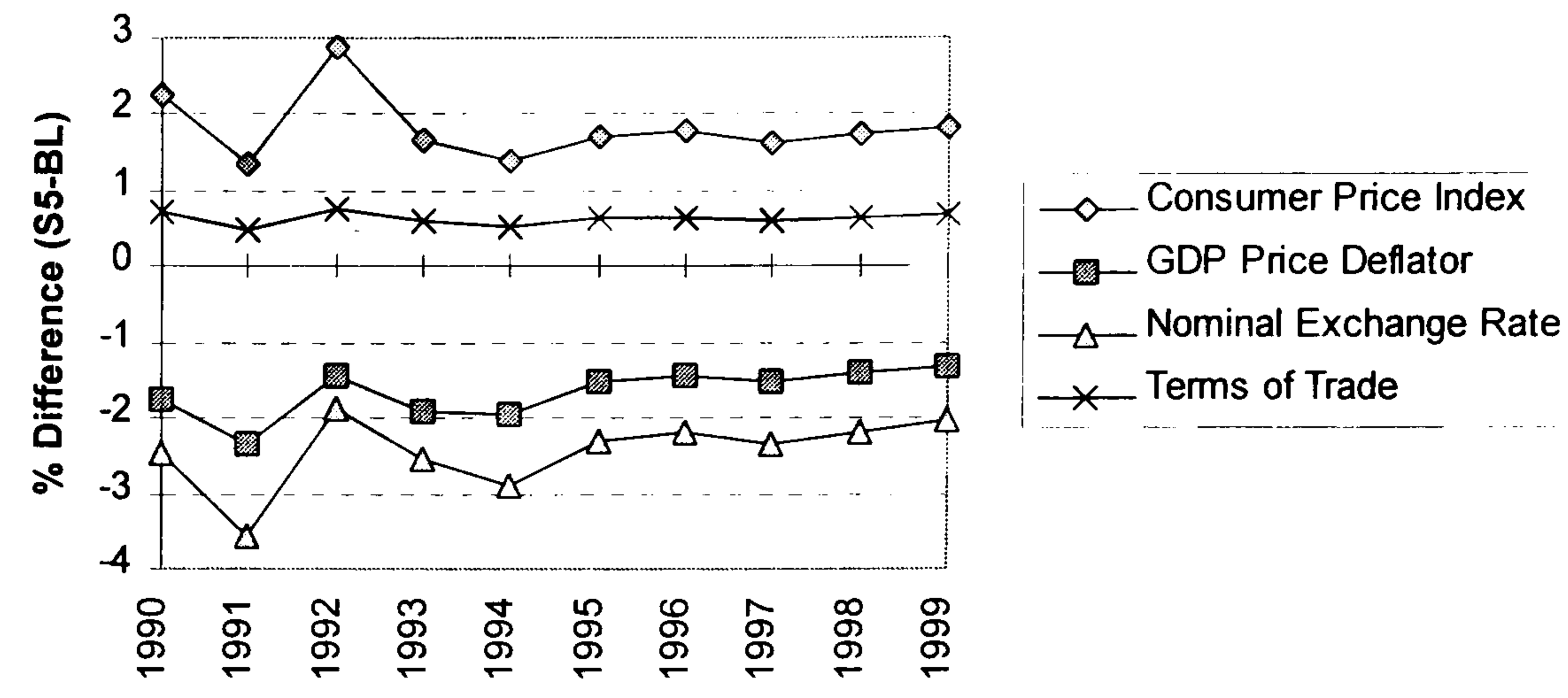


Figure 5.28 S5: Real Wages (In 1983 Prices)

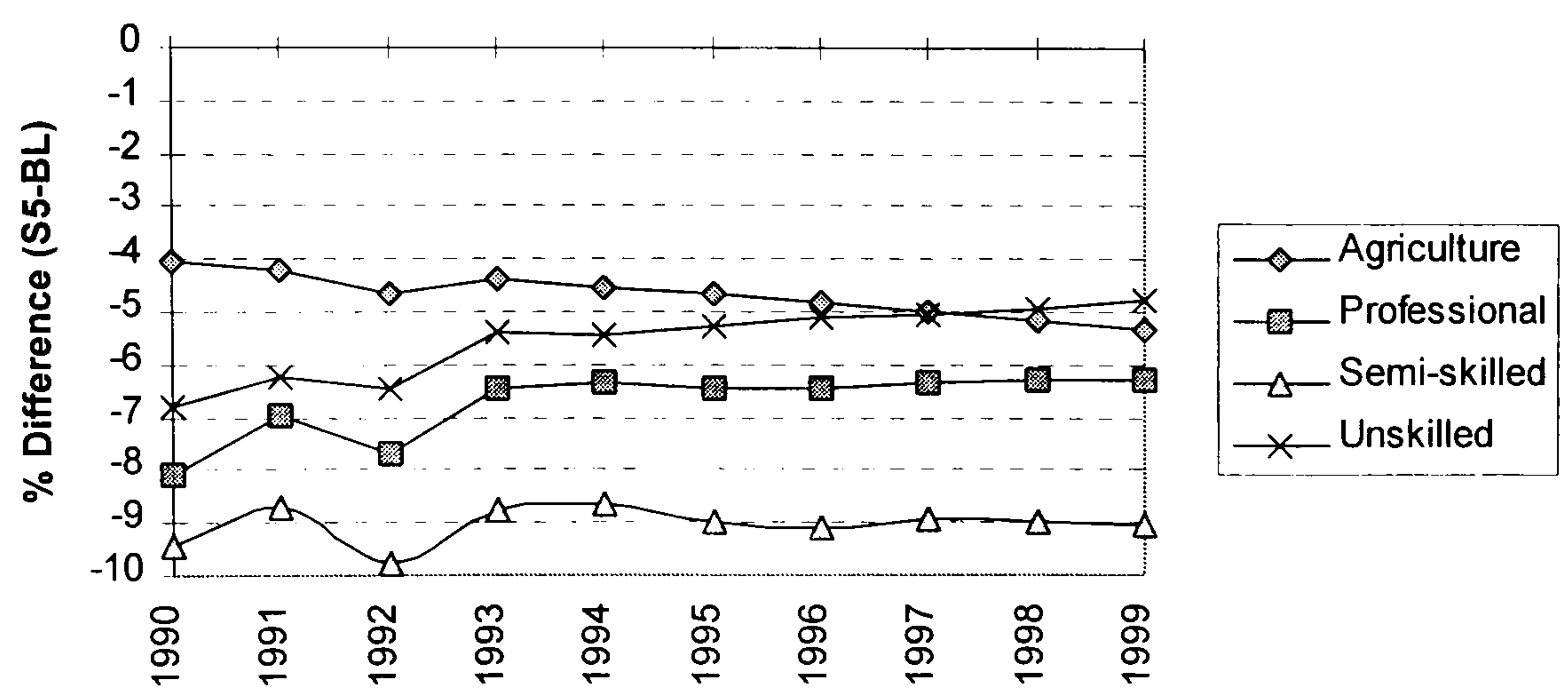
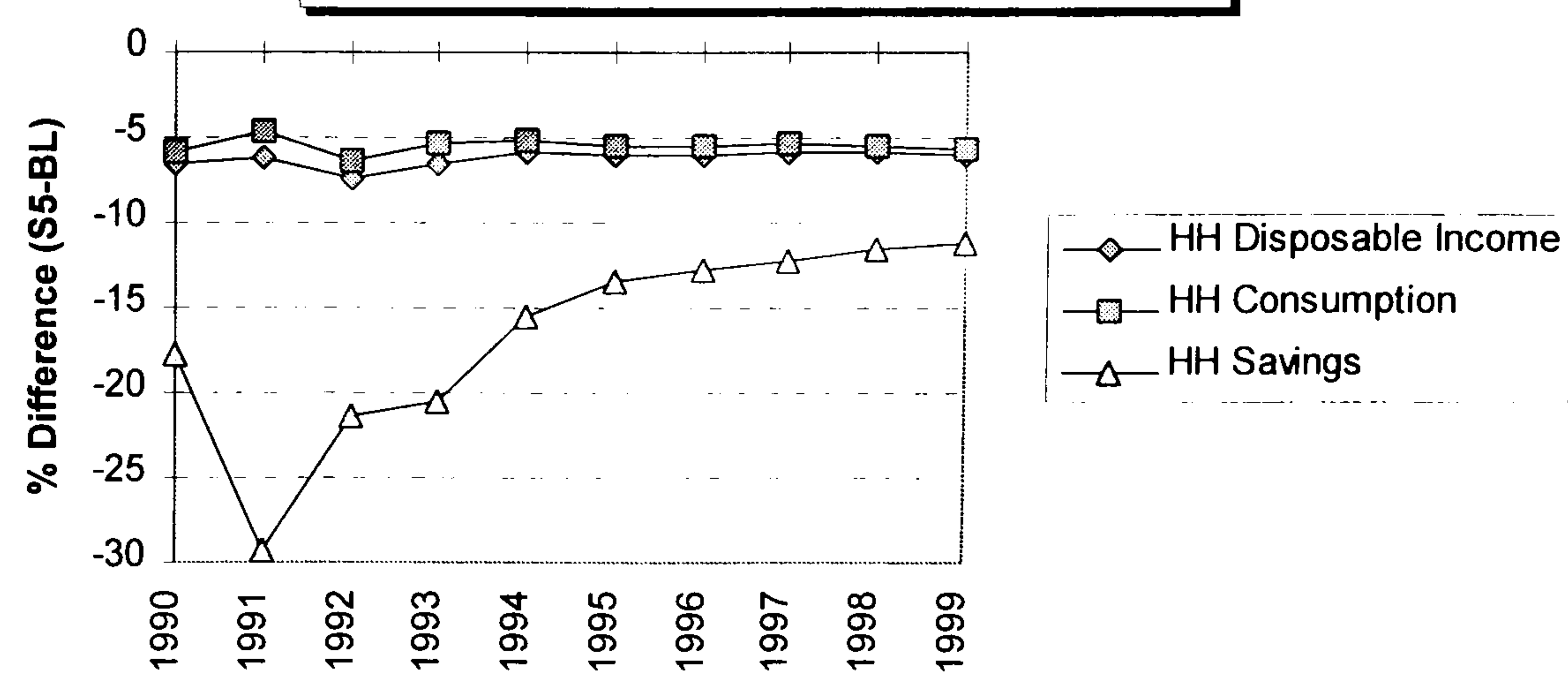


Figure 5.29 S5: Household Aggregates (In 1983 Prices)



The increase of domestic indirect taxes has a negative effect at the aggregate GDP as well as household level. Real GDP and real government consumption decline by around 1-2 percent of the baseline position, while real private consumption falls by 5-6 percent. Higher excise duties on fuel oils, petroleum products and vehicles as well as higher sales tax contribute to higher prices which are passed on to consumers. The CPI rises by about 2 percent above the baseline simulation. There is a slight depreciation of The nominal exchange rate depreciates slightly and increases the competitiveness of exports, contributing to an increase in net exports. At the household level, real household disposable income and consumption declines by about 5 percent (see Figure 5.29).

6.1.6 Increasing non-commodity taxes (S6)

In Simulation 6, non-commodity taxes are raised to generate additional 10 percent revenue for the government. Non-commodity taxes on production are calculated as an *ad valorem* mark-up on the (net factor cost) price of value-added. This tax rise leaves real GDP, government consumption, and total investment practically unchanged over the base position. Real private consumption, however, declines between 2.5-4.0 percent. The nominal exchange rate and CPI are expected to decline within one percent from the base. The GDP price deflator initially rises to around 4.5 percent above the base at the start of the decade, but later falling to around 2 percent. The negative effects of increasing non-commodity taxes are felt more strongly at the household level. Real household disposable income and real household consumption decline by 2-4 percent, while real household savings fall between 10-14 percent over the base position. This decline has partly been caused by the real wages for four categories of workers falling by 4-7 percent during the decade.

6.2 Revenue-Neutral Tax Simulations

In this section, we perform the second group of counter-factual simulations by varying two groups of taxes simultaneously so that the tax reform is revenue neutral. This set of simulations will answer the question whether there could be some economic and welfare gains from changing the existing tax structure without fundamentally affecting the revenue position of the Federal Government projected under the baseline

Figure 5.30 S6: GDP Aggregates (In 1983 Prices)

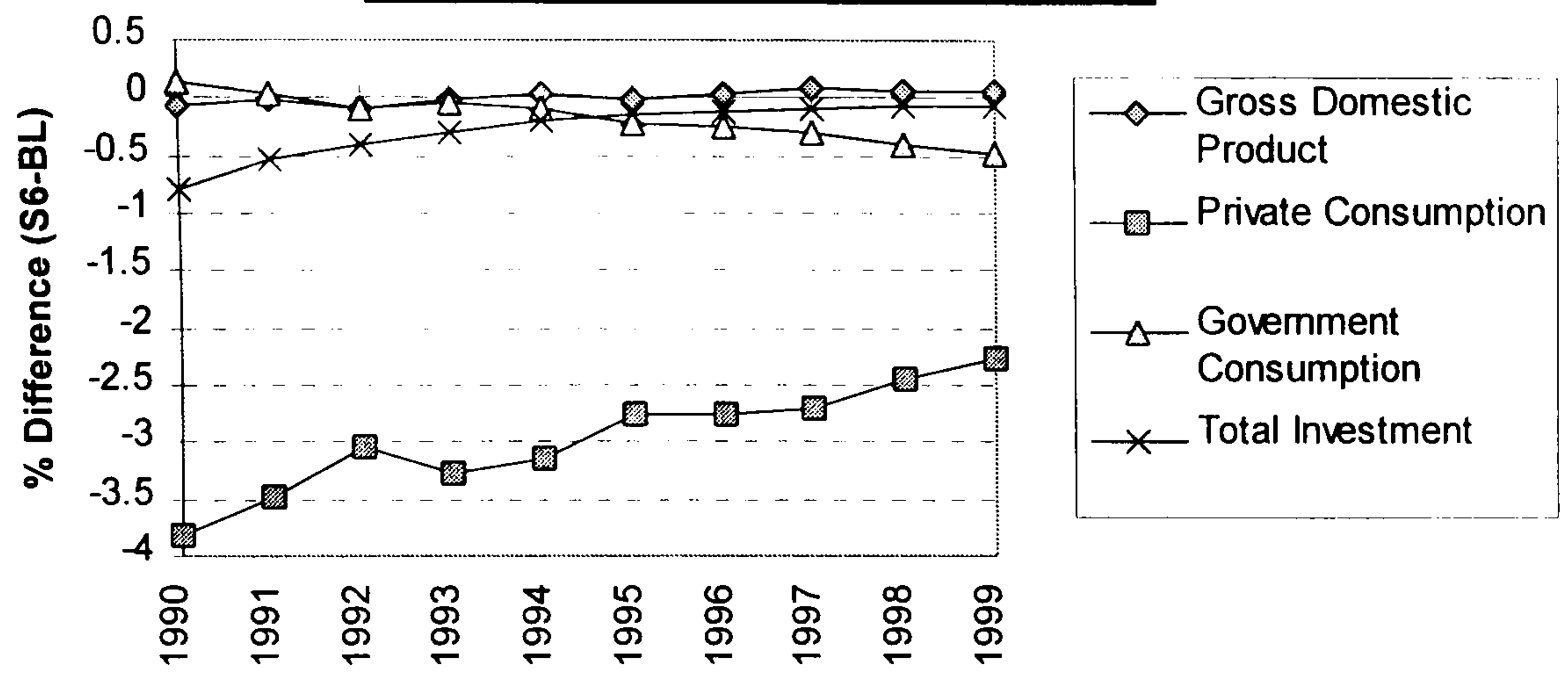


Figure 5.31 S6: Aggregate Prices

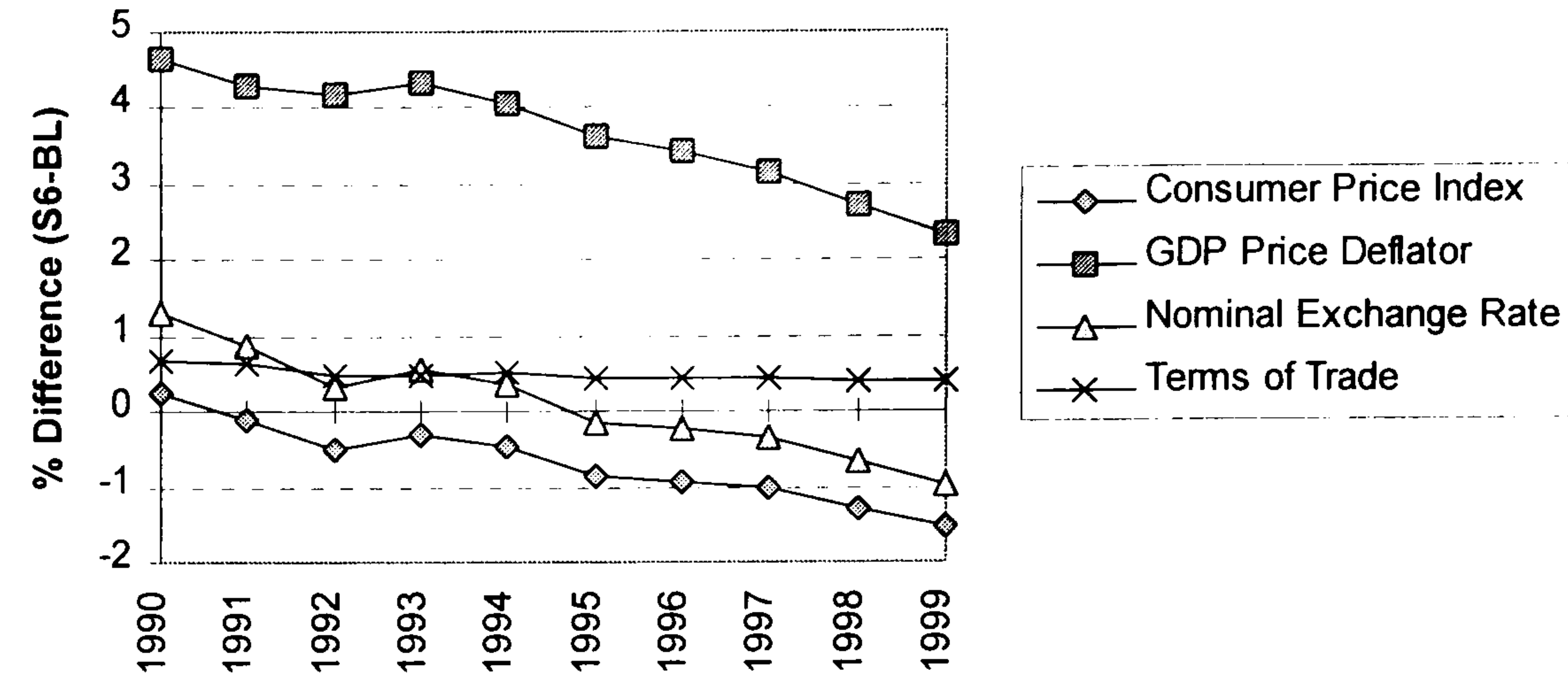


Figure 5.32 S6: Real Wages (In 1983 Prices)

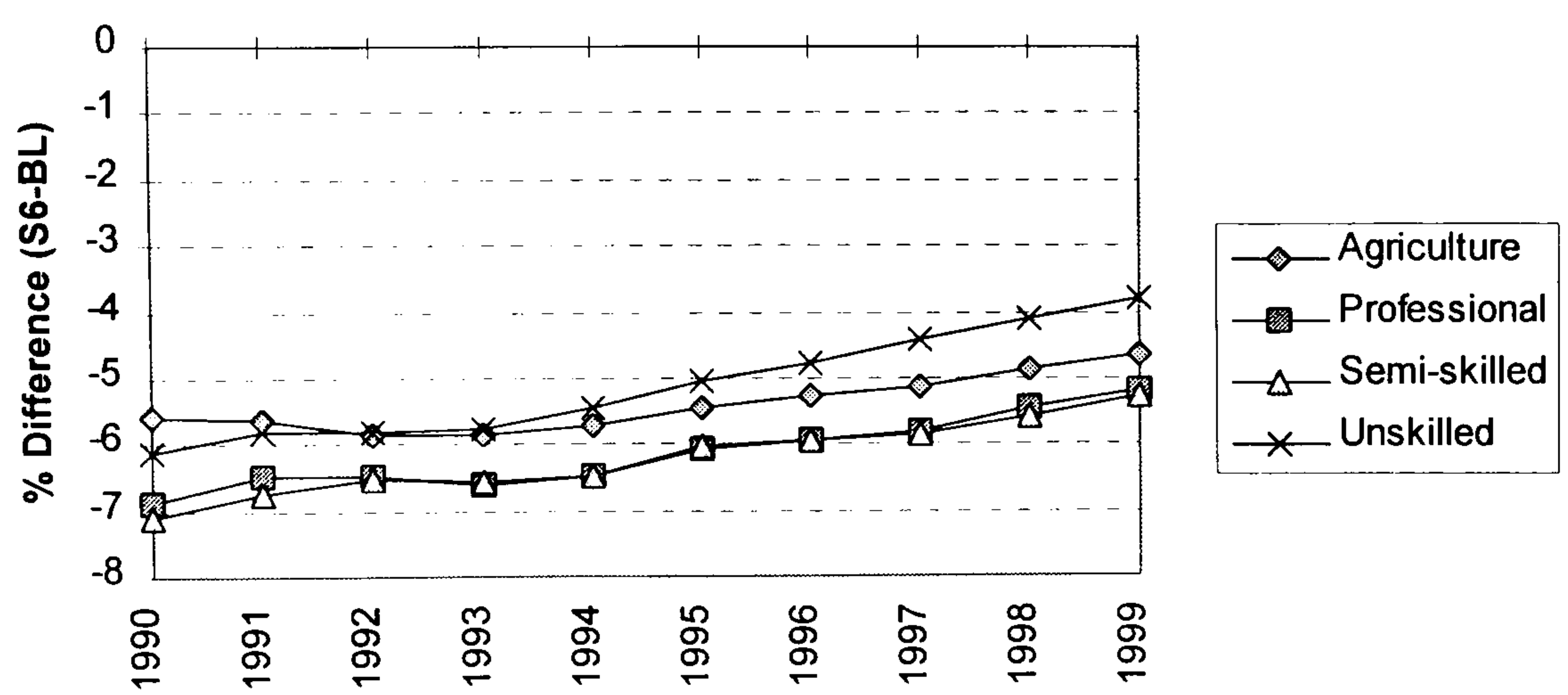
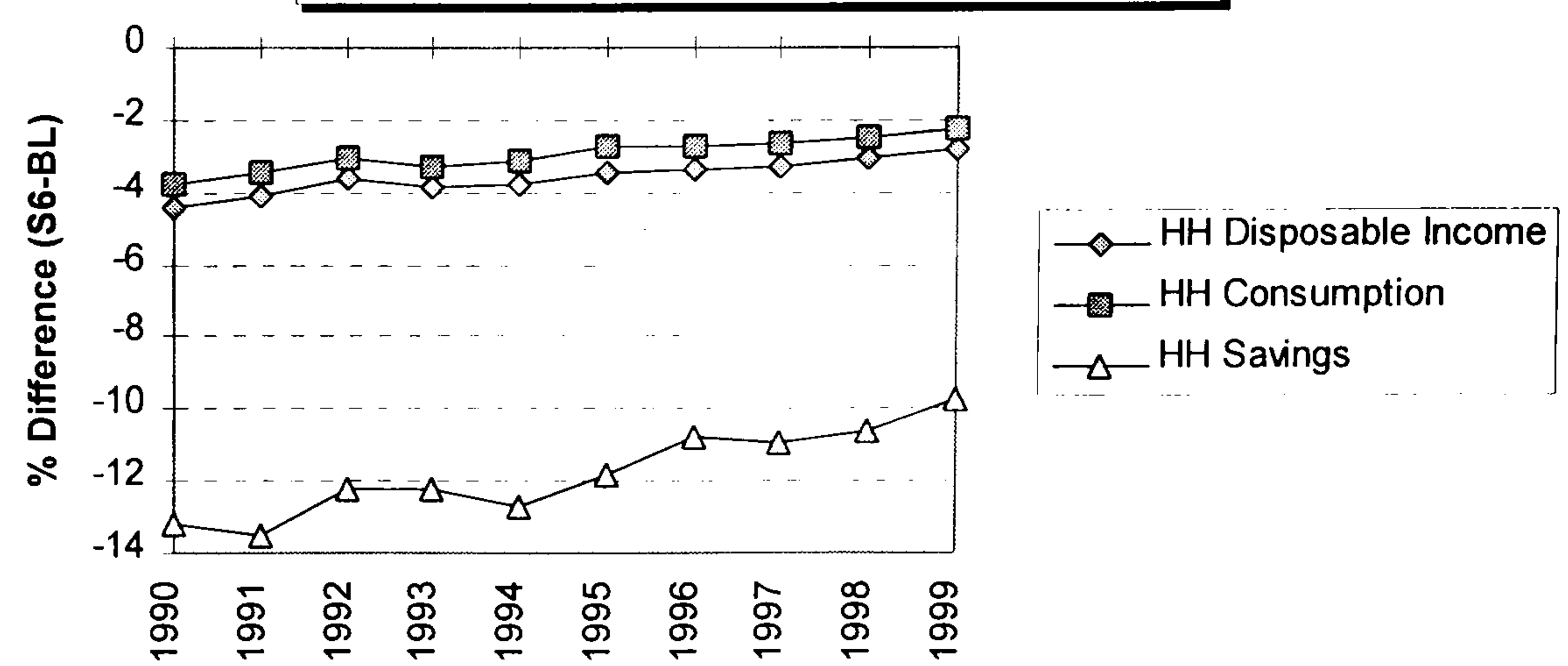


Figure 5.33 S6: Household Aggregates (In 1983 Prices)



simulation. Two simulations are performed here. The first considers the effect of reforming direct taxes, while the second examines the implications of reforming indirect taxes through the introduction of value added tax.

6.2.1 Reducing personal income tax and increasing corporate tax (S7)

In this simulation, personal income tax revenue is reduced by 10 percent throughout the decade. This reduction is balanced by increasing corporate tax such that the net effect of this tax reform leaves the yearly government revenue unchanged from the baseline position. As shown in Simulation 1, a rise in personal income tax has a negative effect on household income and real wages. This is not the case with raising corporate tax. It is useful to bear in mind that although corporate tax revenue can raised by increasing the corporate tax rate, it is by no means the only way of raising revenue from this source. Changes in depreciation allowances, investment subsidies, tax holidays and other breaks will affect the amount of revenue collected from this source.

One way of raising corporate tax revenue in Malaysia is trimming the industrial tax incentives. According to the Financial Survey of Limited Companies (Department of Statistics, 1988), foreign non-manufacturing firms paid 40 percent of their profits in taxes against 44 percent for domestic non-manufacturing firms. Generally, manufacturers pay lower taxes as the result of business tax incentives, which amounts to providing tax subsidy to industry. In fact, some businesses benefit more from these incentives than others. Foreign manufacturers pay 15 percent of their profits in taxes compared to 29 percent for domestic manufacturers. At Malaysia's current state of economic development, it has still not been ascertained whether business tax incentives help to increase inward foreign direct investment (FDI) or to give domestic firms an edge in world trade competition. There was a proliferation of 'pioneer status' firms with the introduction of the Promotion of Investment Act 1986. In addition, there are other incentives, such as the Investment Tax Allowances (ITA), Industrial Adjustment Allowances, abatements, and specific export incentives, which reduce the corporate tax paid by companies. The direct costs of these incentives to the government are the revenue foregone and a reduced tax base. Society loses as a result of the lower pre-tax profits of firms that take full advantage of the incentives available. Notwithstanding the inherent difficulty of attributing and quantifying the effects of specific incentives with

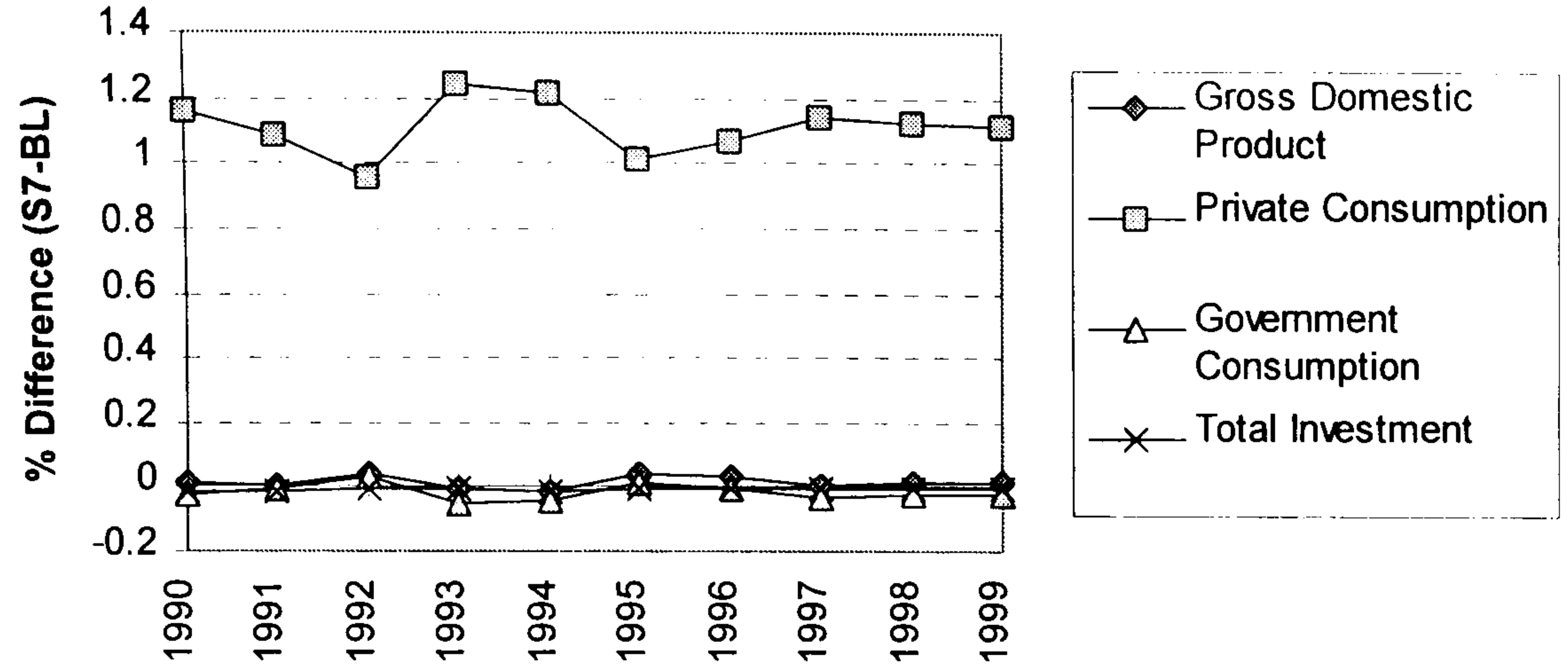


Figure 5.34 S7: GDP Aggregates (In 1983 Prices)

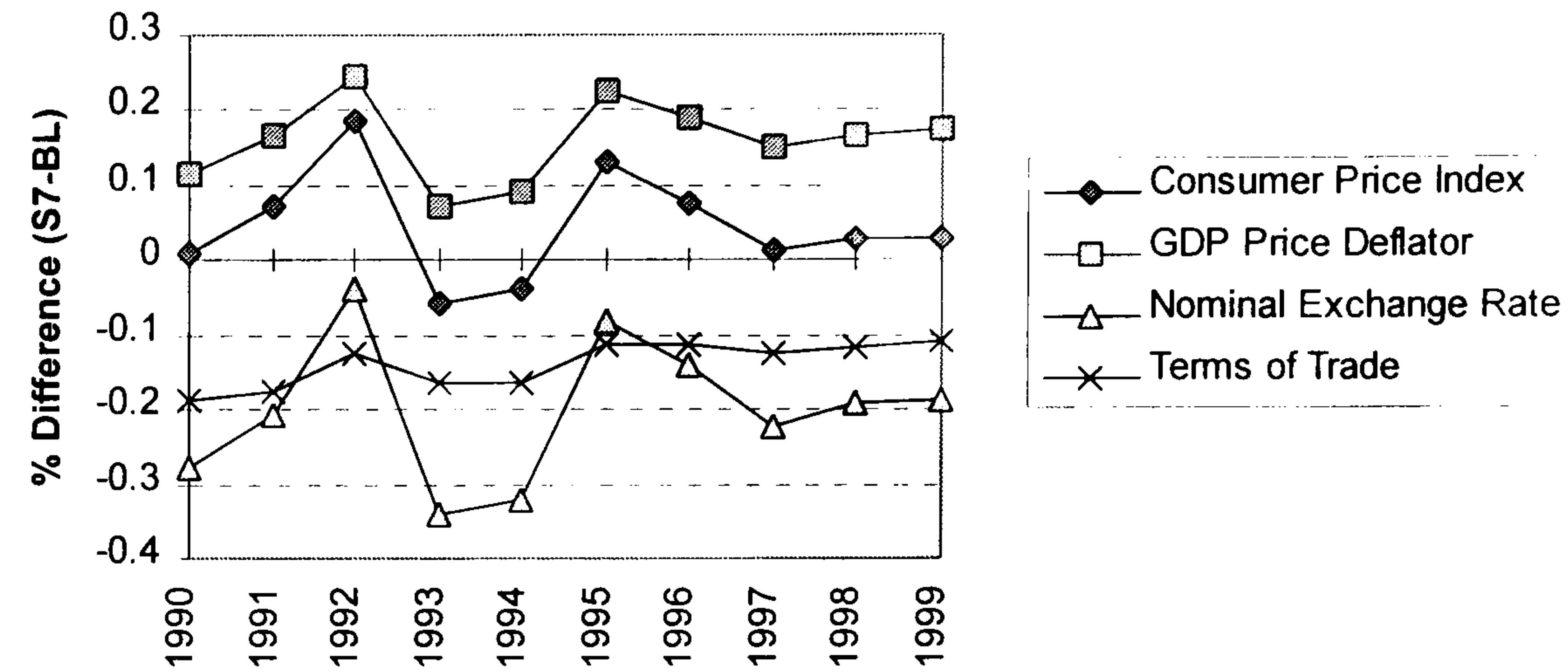


Figure 5.35 S7: Aggregate Prices

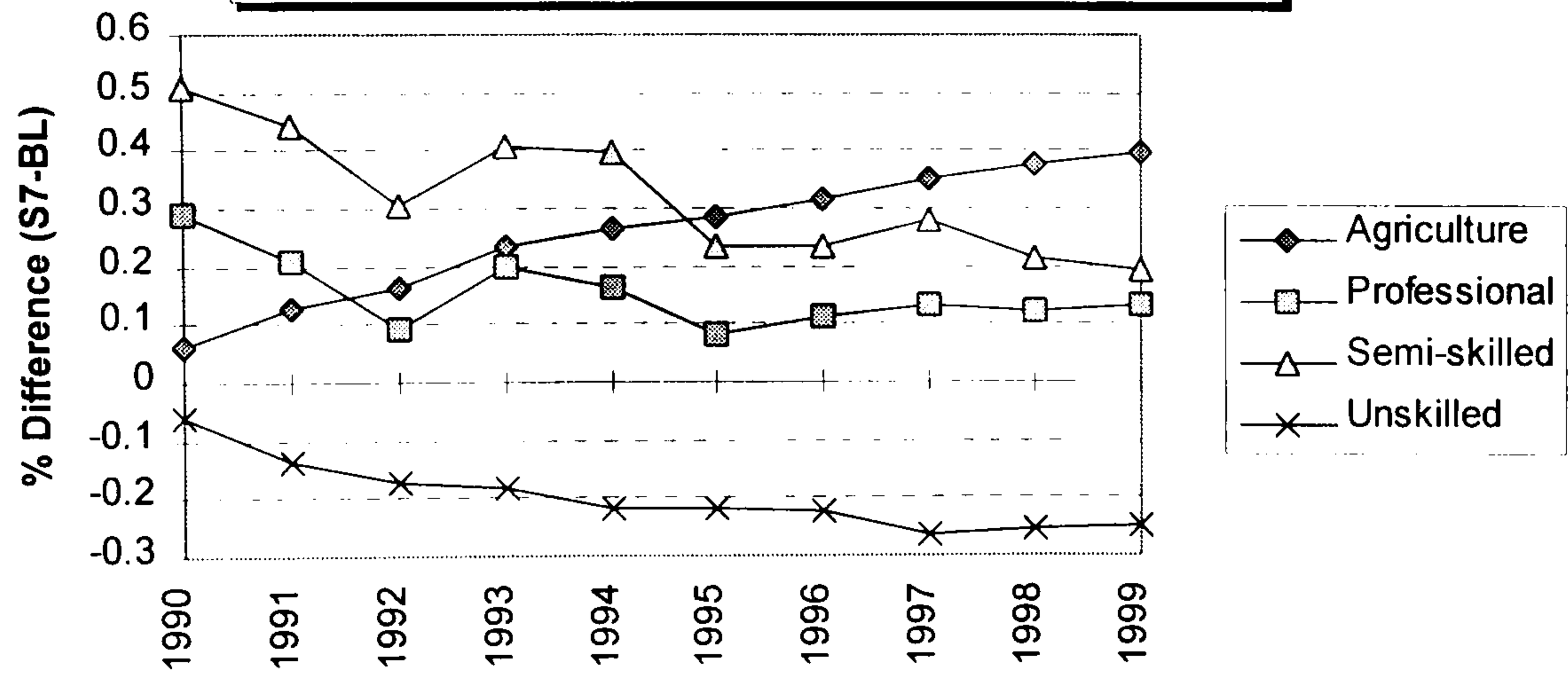


Figure 5.36 S7: Real Wages (In 1983 Prices)

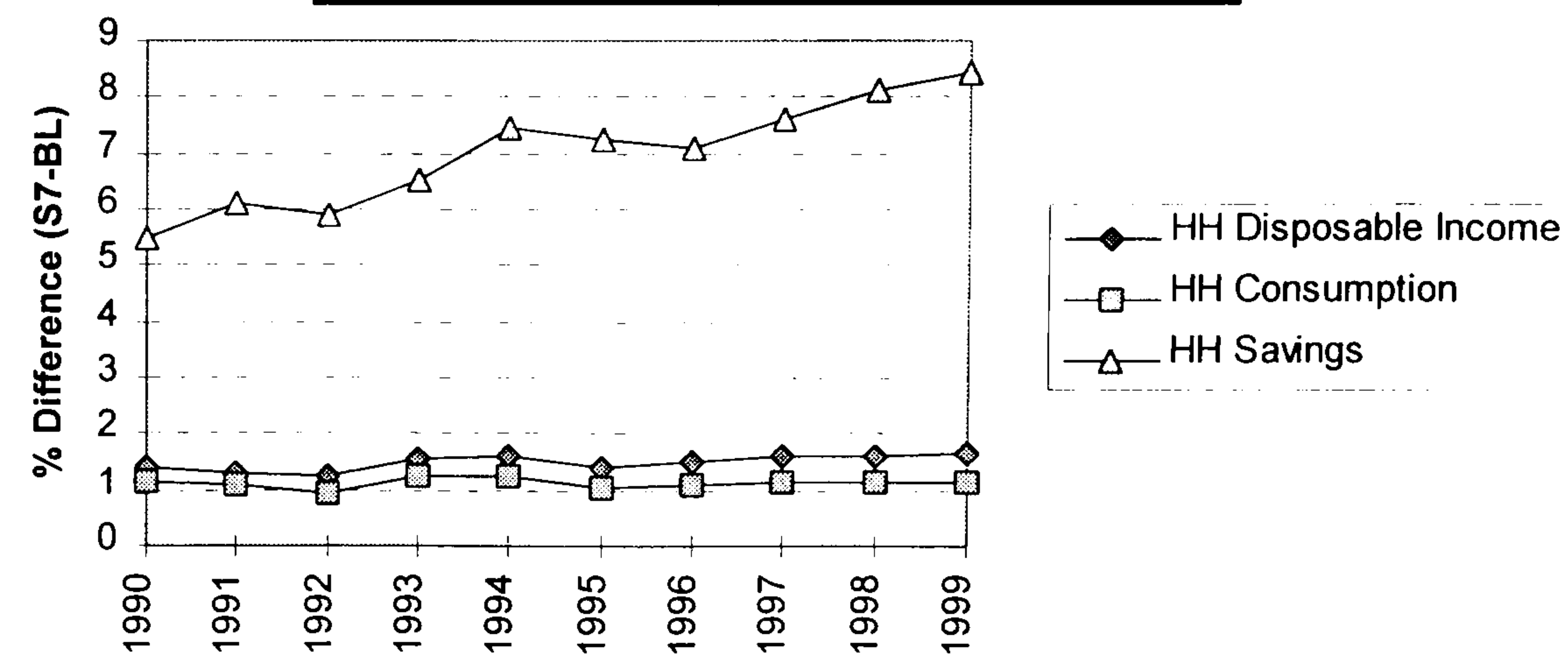


Figure 5.37 S7: Household Aggregates (In 1983 Prices)

certainty, the economic literature hasgenerally been unable to find any relationship between corporate income tax incentives and FDI or trade performance in any other countries.[24]

The results of the simulation compared with the base position are shown in Figure 5.34 through Figure 5.37. While this tax reform leaves real GDP, government consumption and total investment unaffected, private consumption increases by 1-1.2 percent above the base position. This is also reflected in the higher real household disposable income and real household consumption. This tax reform seems to have a strong positive effect on household savings, which is 5-8 percent higher than the base position. There is a rise in the real wages of agricultural, professional and semi-skilled workers which have contributed to the higher household disposable income and an increase in the consumer price index and GDP price deflator.

6.2.2 Adopting value added tax and abolishing sales and service taxes (S8)

In Chapter 4, we discussed about the weaknesses of the existing sales and service taxes and the rationale for adopting a version of the value added tax (VAT). The intention of the Malaysian government in adopting value added tax had been expressed in the past Budget speeches of the Finance Minister. The new value added tax[25] will consolidate and restructure the current sales and service taxes that it replaces. In the model, sales and service taxes are subsumed under Domestic Indirect Taxes. The sources of Non-Tax Revenue (such as stamp duty, vehicle license payments, etc.) are modelled under the rubric of Non-Commodity Indirect Taxes that are levied on activities and calculated as an *ad valorem* mark-up on the net (factor cost) price of value-added. In carrying out this simulation, we transfer these two taxes out of Domestic Indirect Taxes

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[24] This issue was discussed earlier in Chapter 2 of the thesis.

[25] In official pronouncements, the tax is dubbed 'Sales and Service Tax' (SST). However, to avoid confusion with the existing sales tax and service tax which this tax is meant to replace, we use the generic term 'value added tax' for our analysis.

Figure 5.38 S8: GDP Aggregates (In 1983 Prices)

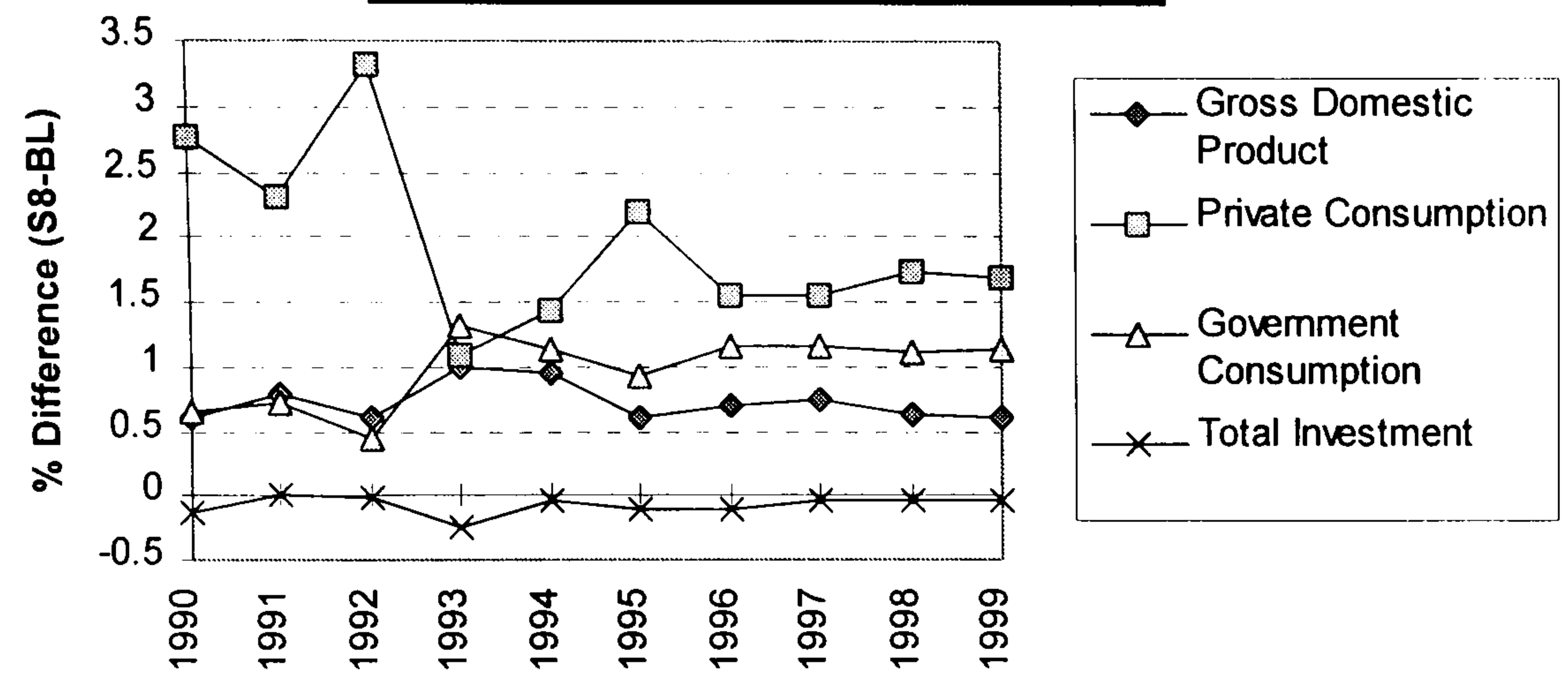


Figure 5.39 S8: Aggregate Prices

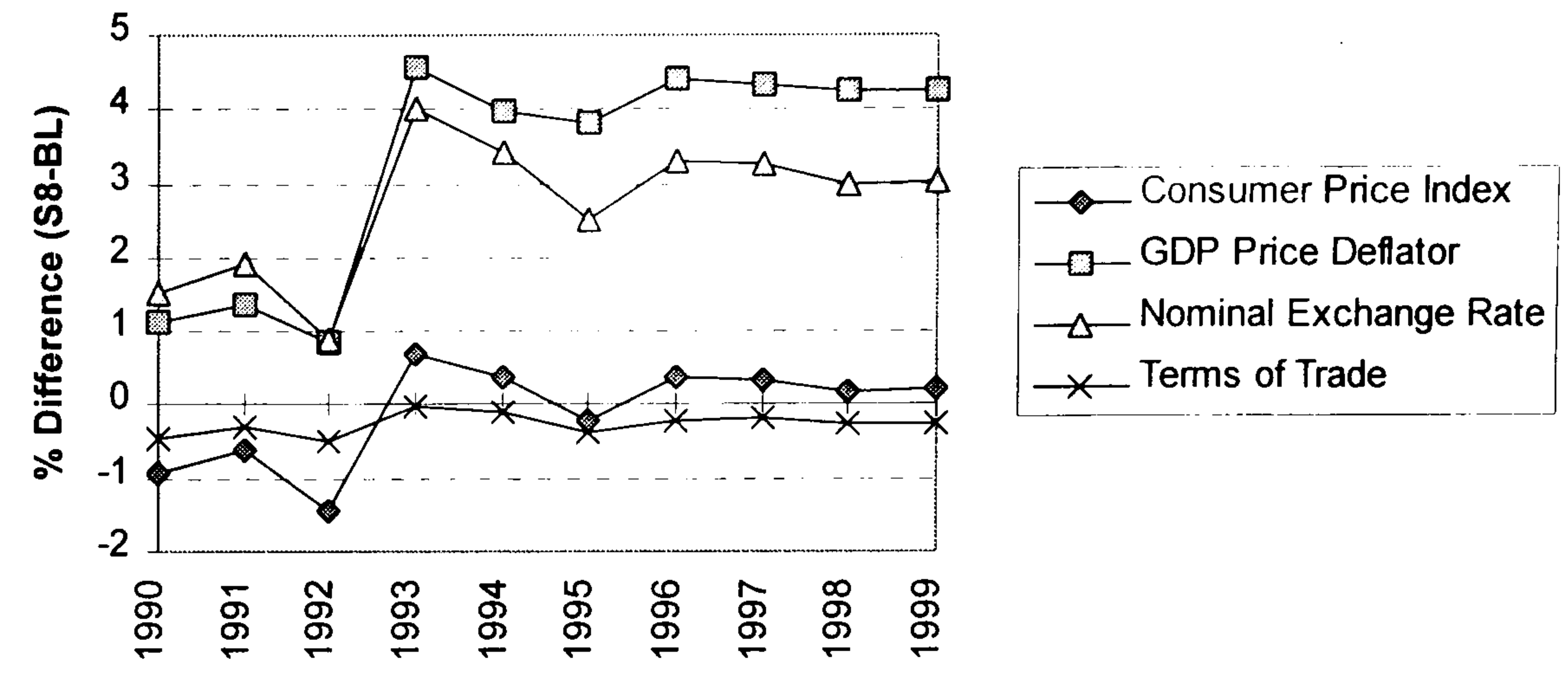


Figure 5.40 S8: Real Wages (1983 Prices)

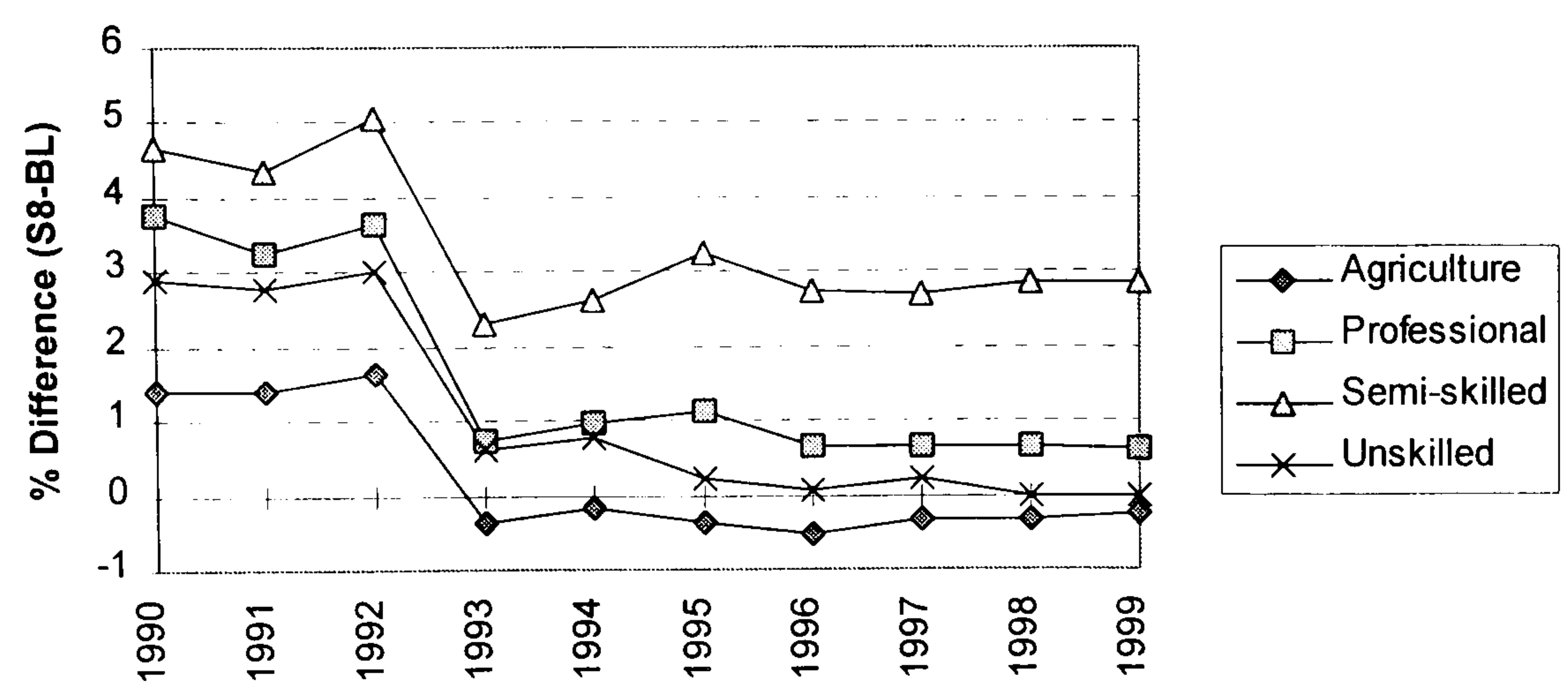


Figure 5.41 S8: Household Aggregates (In 1983 Prices)

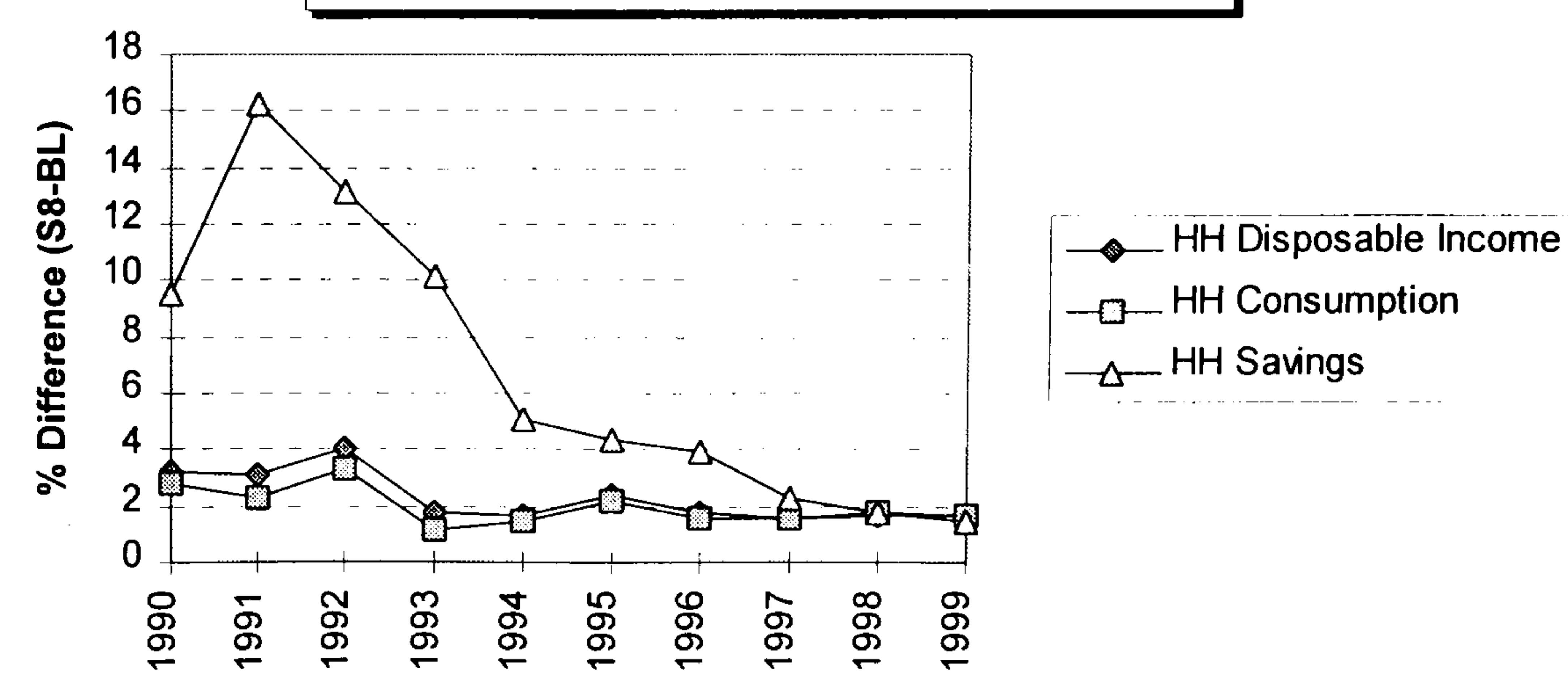


TABLE 5.4 CONTROL TOTALS FOR SIMULATION ON VALUE ADDED TAX

	Domestic Indirect Taxes (DIT)	*Non-Commodity Tax (NCT)*	*Sales Tax & Service Tax (STST)*	*DIT–STST Control*	*NCT+VAT Control*
1990	5,452	6,776	2,563	2,889	9,339
1991	6,444	6,387	2,897	3,547	9,284
1992	7,297	8,075	3,404	3,893	11,479
1993	8,800	7,439	4,081	4,719	11,520
1994	9,654	7,958	4,419	5,235	12,377
1995	10,691	5,680	4,871	5,820	10,551

Source: Calculated from *Economic Report* (Ministry of Finance, 1995).
Assumption: The introduction of VAT is intended to replace the revenue lost from repealing sales and service taxes.

to the Non- Commodity Indirect Tax. The control totals for Domestic Indirect Taxes and Non-Commodity Tax are shown in Table 5.4. The rates for the two taxes are scaled accordingly such that government revenue remains unchanged. In lieu of better data on the anticipated revenue from sales tax and service tax for 1996-99, we assume that the two tax indices for 1995 apply throughout the remaining years of the decade. Compared to the base position, the shift to value added tax is accompanied by an improvement in real household disposable income and real consumption. Consumer prices fluctuate within one percent of the base position. Gross domestic product and government recurrent expenditure register are higher by 0.5-1.0 percent than the base. There is also an improvement in real private consumption throughout the decade. The adoption of value added tax would have a slight effect in stimulating exports and imports, with a slight gain in net exports.

There has always been a worry on the part of policy makers and members of the public that the adoption of VAT would contribute to increases in retail prices. The simulation shows that the consumer price index is expected rise by no more than 1 percent following the shift from sales and service taxes to VAT. It will be maintained at that level from 1993 onwards. As discussed in Chapter 3, VAT would address the problem of tax cascading encountered in the sales and service taxes that contribute to higher retail prices. However, the question whether the introduction of VAT causes inflation is also very much an implementation issue. It is possible that consumer prices would be affected if there were a great deal of uncertainty among the public about how VAT works. As a contingency measure against uncertainty, traders may attempt to widen their margins and pass on the higher retail prices to consumers during the introductory phase of the tax. This problem caused inflation in Indonesia when it first implemented VAT (Ridwan, 1988). At the aggregate level, the adoption of VAT would contribute to an increase in the GDP price deflator of 4 percent for most years of the decade. This is a once and for all shift in prices, but will not lead to an acceleration of price changes. This simulation is consonant with the experience of other countries. In examining the experience of 35 countries which adopted VAT, Tait (1988) found that in 22 countries, there was little or no effect of the introduction of VAT on the consumer price index. In seven countries, there was a shift in the trend of the consumer price index; in five countries there was an acceleration in CPI; and in only one was there both a shift and acceleration in CPI.

6.3 Revenue Enhancing Value Added Tax Reform (S9)

In this simulation, we examine the implications of using value added tax to raise 10 percent government revenue (VAT10). The changes in real GDP, government consumption, and total investment in relation to the base are similar to those in Simulation 8. Real GDP and real government consumption rise between 0.5-1 percent, while real total investment falls by less than 0.5 percent for most of the years. Unlike Simulation 8, real private consumption is expected to fall below the baseline estimation. This is mainly brought about by the decline in real wages where all labour categories are affected. Agricultural workers will experience the largest decline with real wages falling between 3-5 percent of the baseline simulation. At the household aggregate level, real household disposable income and real household consumption are slightly below the baseline position, while real household savings register a larger decline after 1994. This is unlike Simulation 8, which has a positive effect on the household aggregates. The pattern of changes in aggregate prices is similar to Simulation 8, although in this simulation the rise in GDP price deflator above the baseline is greater.

Figure 5.42 S9: GDP Aggregates (In 1983 Prices)

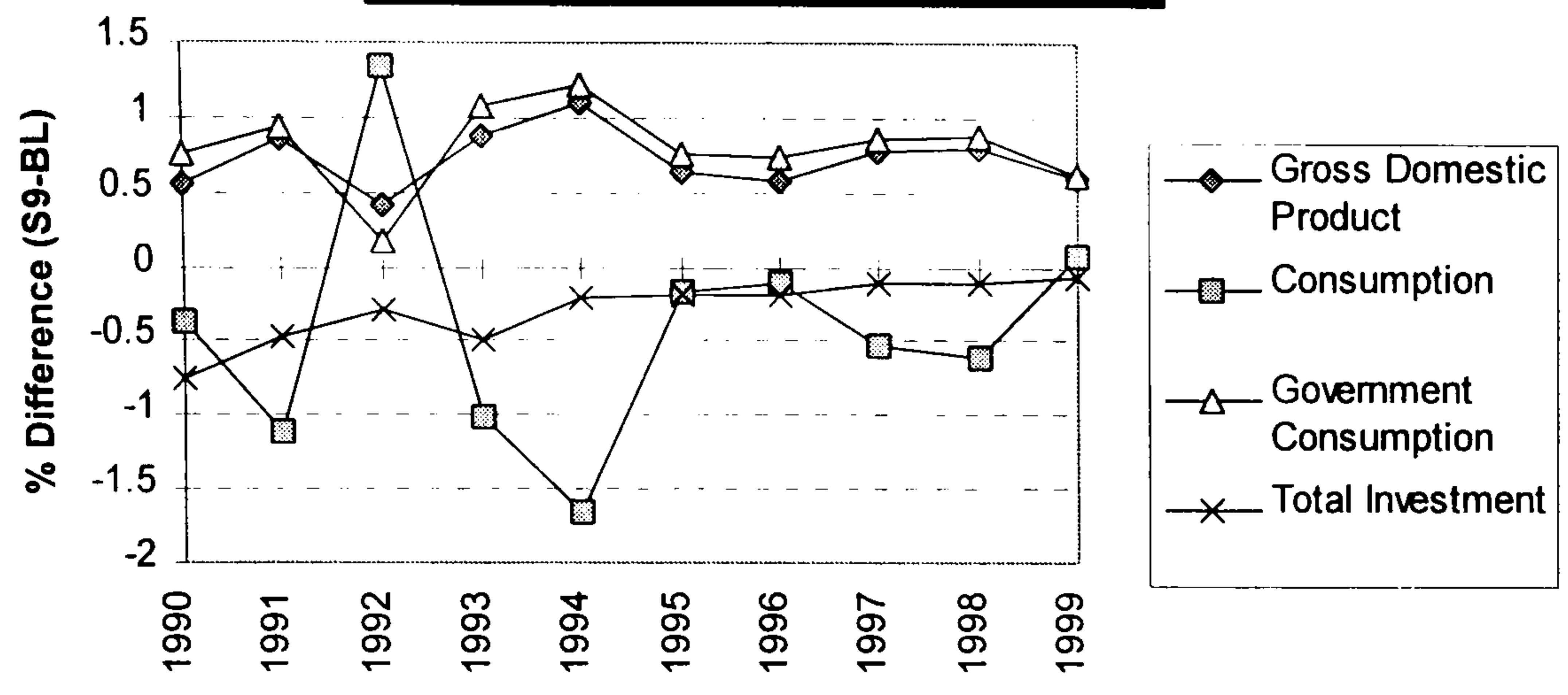


Figure 5.43 S9: Aggregate Prices

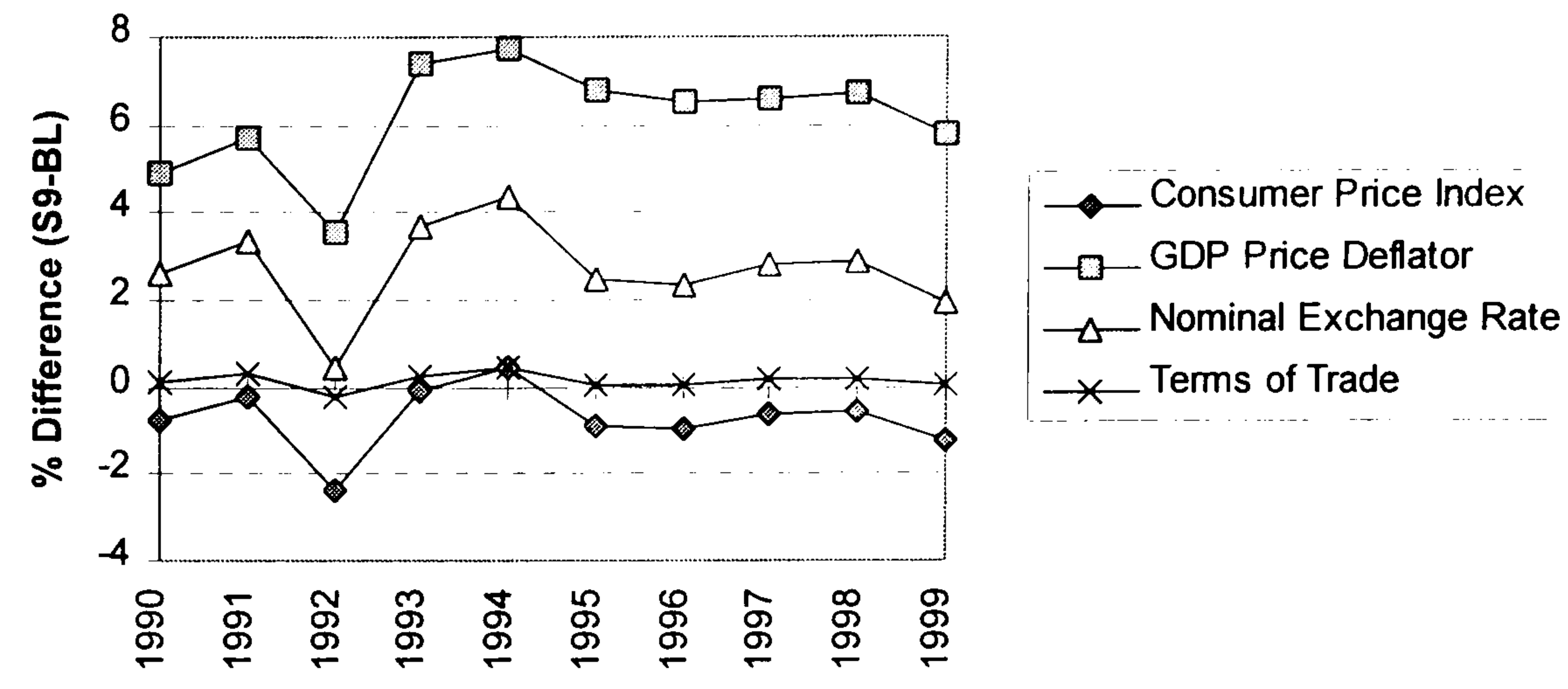


Figure 5.44 S9: Real Wages (In 1983 Prices)

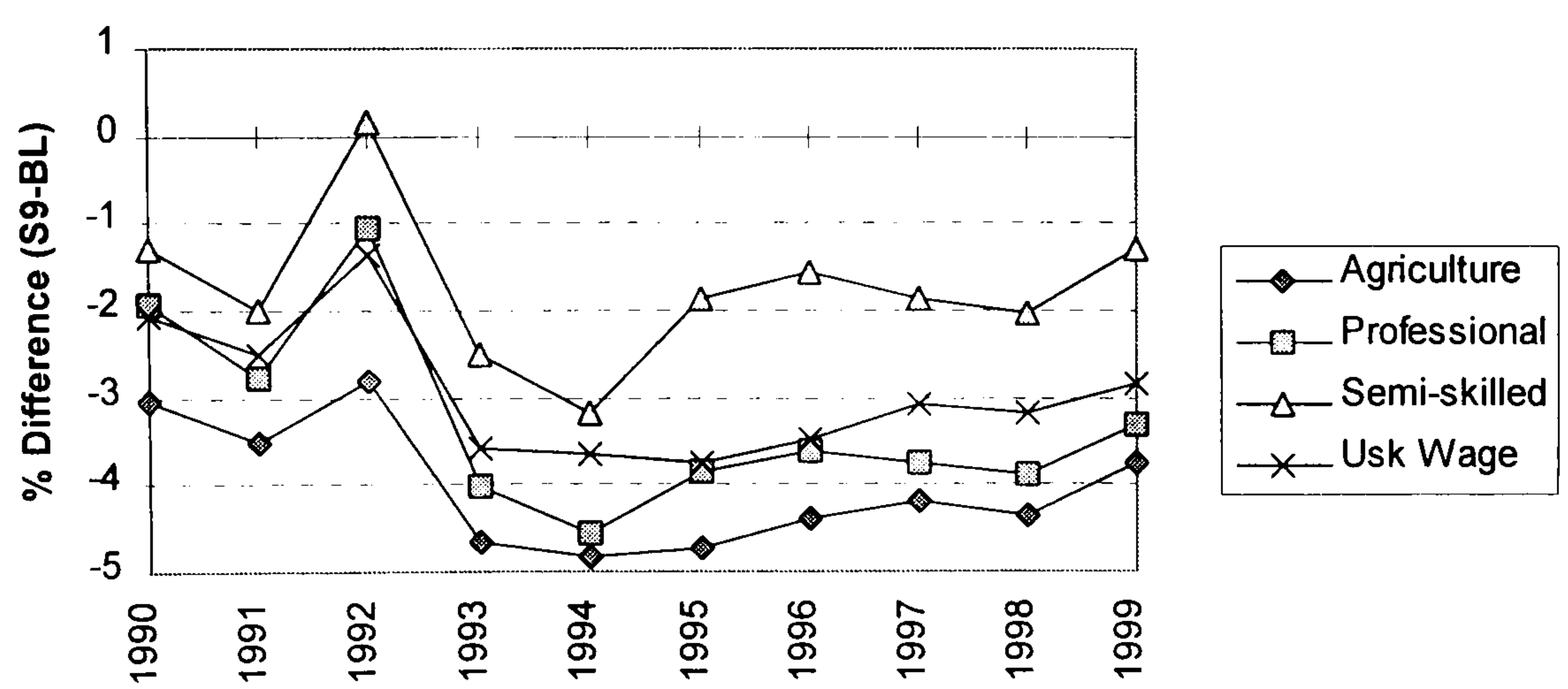
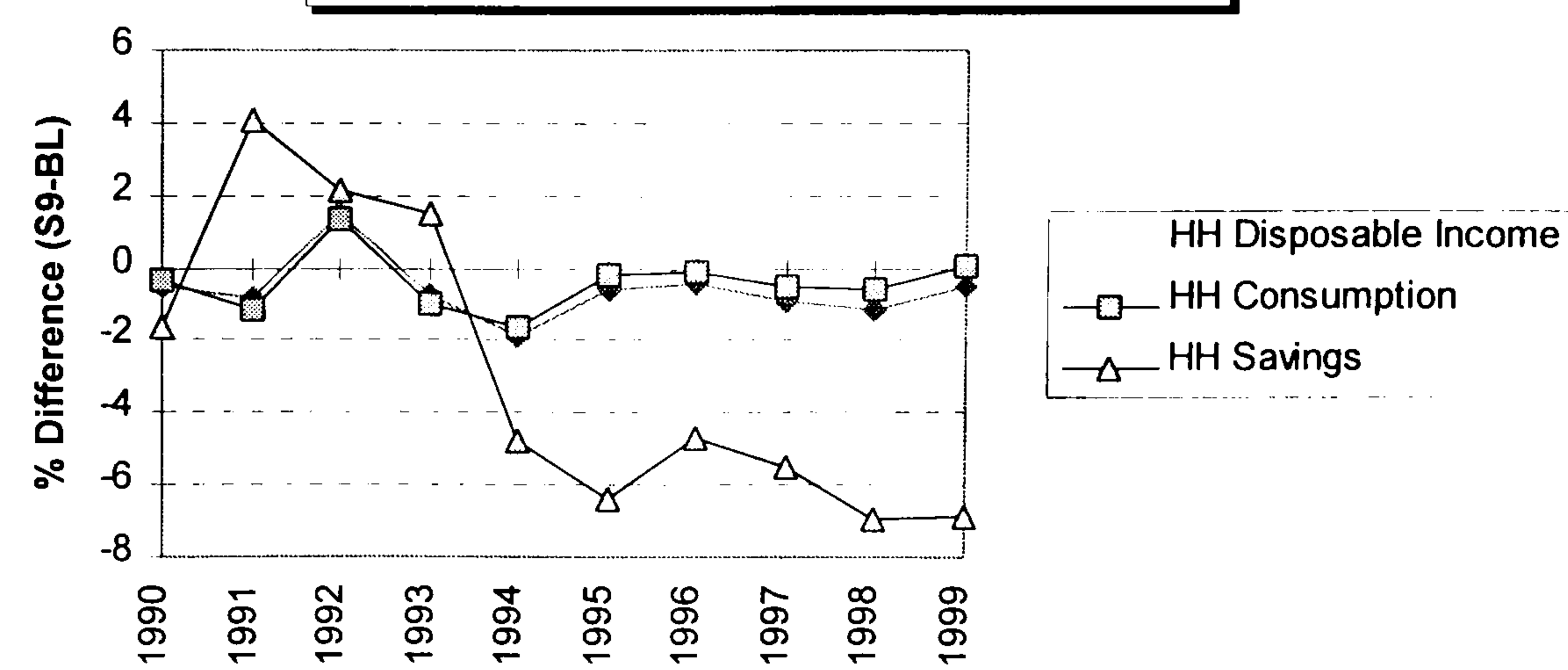


Figure 5.45 S9: Household Aggregates (In 1983 Prices)



7 SUMMARY OF FINDINGS

In this chapter, we perform seven tax reform simulations on raising 10 percent of government revenue and two revenue-neutral tax reform simulations. In order to compare the effects of the tax reforms, we shall consider their relative merits in terms of the four sets of indicators used in the analyses above. A summary of the simulation results is given in Table 5.5.

First, we consider the seven simulations on revenue enhancement tax reform. The simulations show that it is possible to raise the level of real GDP over the baseline while increasing the rates of two taxes. They are corporate tax (S2) and value added tax (S9). In both cases, real government consumption will increase, although the response of real private consumption depends on the effect of these taxes on the household aggregates. The effects of raising personal income tax (S1) and non-commodity taxes (S6) on the GDP aggregates are fairly neutral, while increasing the three other taxes, i.e. export tax (S3), import tax (S4) and domestic indirect tax (S5), will lead to a decline in GDP and private consumption.

At the household aggregate level, only the simulation on raising corporate tax has a positive effect on household disposable income, consumption and savings. The effect on households of using non-commodity tax with value added tax to raise 10 percent of government revenue (VAT10) is fairly similar to the baseline position, especially later in the decade. The remaining five other taxes simulations show a worsening of the household aggregates.

In terms of aggregate prices, the simulations on increased corporate tax, exports and import tax indicate higher consumer price indices and GDP price deflators at least for the first part of the nineties, while increasing income tax leads to lower consumer prices. Simulations S5, S6, and S9 show that increasing domestic indirect tax, non-commodity tax, and VAT10 to raise government revenue have a mixed effect on CPI and GDP price deflators. Tax increase generally leads to lower real wages compared with the baseline, except for agricultural wages in S2 and S3 and unskilled wages in S1 and S2, which tend to be higher than the baseline position.

TABLE 5.5 COMPARISON OF SIMULATION RESULTS

	Revenue Enhancing Tax Reform Simulation							*Revenue Neutral Simulation*	
Indicators	*S1*	*S2*	*S3*	*S4*	*S5*	*S6*	*S9*	*S7*	*S8*
GDP Aggregates									
Gross Domestic Product	0	+	–	–	–	0	+	0	+
Private Consumption	–	+	–	–	–	–	–	+	+
Government Consumption	0	+/–	+	–	–	0/–	+	0	+
Total Investment	0	–	0	–	0	–/0	–/0	0	0
Aggregate Prices									
Consumer Price Index	–	+/–	+	+/–	+	–	–	+	–/0
GDP Price Deflator	–	+/–	+	+/–	–	+	+	+	+
Nominal Exchange Rate	+/–	+/–	+	–	–	+/–	+	–	+
Terms of Trade	+	+	–/+	0	+	+	0	–	0
Real Wages									
Agriculture	–	+	+/–	–	–	–	–	+	+/0
Professional	–	–	–	–	–	–	–	+	+
Semi-Skilled	–	–	–	–	–	–	–	+	+
Unskilled	+	+	–	–	–	–	–	–	+/0
Household Aggregates									
Disposable Income	–	+	–	–	–	–	0/–	+	+
Consumption	–	+	–	–	–	–	0/–	+	+
Savings	–	+	–	–	–	–	+/–	+	+

Note: The symbols refer to the direction of the simulation results compared with the baseline outcomes. The symbol '+' means an increase, '–' is a decline, and '0' is no change over the base position. When two symbols appear together it means that the outcome is mixed. For instance, '+/–' refers to a rise for some of the years followed by a decline.

Simulations: S1 = raising personal income tax; S2 = raising corporate tax; S3 = raising export tax; S4 = raising import tax; S5 = raising domestic indirect tax; S6 = raising non-commodity tax; S7 = raising corporate tax and lowering personal income tax; S8 = raising non-commodity tax and lowering domestic indirect tax by the amount of sales and service taxes, i.e. switching to VAT; S9 = raising non-commodity tax including VAT.

Taken as a whole, if the Malaysian government intends to raise revenue from a single tax source without hurting households or negatively affecting GDP aggregates, then corporate tax (which include petroleum tax) would indeed be an ideal candidate. In fact, as shown by Simulation 2, the effect on these two aggregates can be positive. If the revenue increase were to come from more than one tax source, VAT10 in combination with corporate tax would be a good way to raise revenue. Income tax can also be used for revenue generation since it does not have a negative effect on real GDP. However, it can have a sizeable reduction on real household disposable income and private consumption compared with the base. The advantage of raising revenue from these three sources is that the revenue derived from these taxes is large enough without the government having to levy a large increase in their tax rates. For instance, to raise one percent of government revenue in 1990 from a single tax source, the tax rates would have to be increased by 3.5 percent for corporate tax, 6.6 percent for non-commodity taxes with VAT (or VAT10), and 8.2 percent for personal income tax. For the government to raise the same amount of revenue from the other taxes, the tax rates would have to be increased by 36.8 percent for export tax, 17.6 percent for import tax, 11.6 percent for domestic indirect tax, and 9.1 percent for non-commodity taxes excluding VAT.

Regarding the revenue neutral tax reforms, both the simulations S7 and S8 bring an improvement to the household aggregates, with higher levels of disposable income, consumption, and savings in real terms. In the case of switching from the current sales and services taxes to VAT, there is also an improvement in the levels of GDP. Real wages for many categories of workers are higher than the baseline position. This increase brings an improvement to household disposable income as well as slightly higher price levels. The two simulations indicate that there could be some economic and household welfare gains by reforming both the direct as well as the indirect taxes in Malaysia.

In terms of policy implications, it would be useful to discuss the simulation results in relation with the MIER Tax Reform Proposals and Bardai's (1993) recommendations. The MIER Tax Reform Group put forward many proposals which included the reduction of corporate tax rate, broadening the coverage of tax incentives, reducing the top rate of personal income tax, raising the rebate given to taxpayers with chargeable income not exceeding RM10,000, phasing out export taxes on traditional commodities, and improving on the sales and service taxes while the adoption of a value-added type tax is being considered. Bardai argued that the corporate tax rate should not be reduced since this tax is one of the most efficient and productive tax instruments in the economy and its tax burden distribution was found to be positive. He supported the introduction of VAT system, which he said would be non-inflationary, as well as the abolition of export tax.

Our simulations support lowering income tax and adopting VAT system, both of which would be beneficial to households and the economy. We agree with Bardai that corporate tax should not be reduced. As shown by our simulations, the increase in corporate tax is not expected to have negative effects for real household and GDP aggregates. In fact, there might be some benefits to be gained by raising tax revenue from this source. Some of the actions could include rationalising the generous tax incentives offered to corporations. There had been arguments that export tax is regressive and should be reduced. Since the MIER tax reform proposals, duties on the export of primary commodities had fallen, and in many cases eliminated. Arguments about the regressivity of this tax on poor households now no longer apply as they used to. Petroleum export is currently by far the most important contributor to export tax (over 97 percent).

8 CONCLUSION

The computable general equilibrium model is a powerful analytical tool for policy simulation and represents a substantial advance over the earlier techniques used in economic and development planning, such as input-output model and linear programming model. Unlike the traditional partial equilibrium approach which relies on *ceteris paribus* assumptions, CGE model enables an analyst to undertake a comprehensive examination of a tax reform, with its complex interactions among different sectors and agents in the macro economy.

In this chapter, we used M^4, the latest CGE model developed for Malaysia, in our counterfactual tax reform simulations. The model was calibrated on the Malaysian 1983 Social Accounting Matrix and was subsequently updated based on more recent data from the Malaysian National Accounts for 1990. The basic model for our tax policy reform simulations has an essentially neo-classical model specification, with the supply-side driving the economy. Before performing tax simulations for the 1990s, the model was calibrated so that it produced estimates for a number of key endogenous variables that corresponded with actual development. In establishing the sectoral growth rates and the macroeconomic framework, we were guided by the Malaysian Second Outline Perspective Plan for 1991-2000. It was also necessary to reprogram the model so that more details on the various sources of government revenue and expenditure could be obtained from the output. The model was also calibrated so that the revenue from various tax sources matched with published data for 1990-95. From 1996 onwards, we assumed that the tax indices for 1995 remained valid for the rest of the decade. Through iterative model calibrations, we arrived at a baseline simulation which replicated rather well the features and trends of the Malaysian economy and its tax structure. The baseline simulation was then used as the standard against which we compared the outcome of the tax reform simulations.

In the previous chapter, we discussed about how the Malaysian Government is actively taking steps to reform its tax system, in pursuit of the objectives of economic growth, industrial efficiency, inflation control, and improved public sector finances. This chapter explores what the category of taxes could be raised to generate 10 percent of government revenue, with minimal negative effects for households and the economy. The main conclusion from the simulations is that probably the most ideal tax for this purpose is corporate tax, which for the purpose of our estimation includes petroleum income tax. The two other taxes that could be used in combination with corporate tax are VAT10 and possibly income tax, although the latter would have a negative effect on household aggregates and private consumption.

The chapter also investigates if there could be some efficiency gains from reforming the structure of direct and indirect taxes in a revenue-neutral context. For the reform of direct taxes, we reduce personal income tax by 10 percent and calibrate the increase in corporate taxes such that government revenue will be similar to the baseline position. This reform will have a neutral effect on GDP aggregates but a positive effect on households. In simulating the reform of indirect taxes, we also explore the benefits of opting for VAT to replace the existing sales tax and service tax. The shift to value added tax was accompanied by an improvement in real household aggregates, as well as real

GDP and private consumption. This simulation showed a slight effect in stimulating international trade, with some gain in net exports. Assuming that the implementation of this tax is well executed, the introduction of VAT in Malaysia was not foreseen to bring inflation. The GDP price deflator would rise by 2 percent throughout the decade which suggests that there would be a once and for all shift in prices, without the acceleration of price changes. This result suggests that the adoption of VAT would not be inflationary, and this is consistent with the experience of many other countries that have adopted this tax system.

Chapter 6

LABOUR SUPPLY WITH TAXATION

LITERATURE REVIEW

1. INTRODUCTION

This chapter and the next investigate the labour supply behaviour of household members subject to income taxation in the case of a developing country. This chapter discusses the theoretical aspects of estimating the parameters of labour supply with taxation, while the next chapter performs an empirical analysis of labour supply with taxation on the Malaysian data set.

Labour supply has traditionally been viewed in terms of the demand for leisure. The substitution and income effects operate together when there is a change in the wage rates. According to theory, an increase in wage rates would increase the price of leisure relative to the time spent at work, thereby increasing the hours of work through the substitution effect. A wage increase would also increase the demand for leisure, which is assumed to be a normal good, as a result of the income effect. According to microeconomic theory, an increase in net wage resulting from tax reduction could either reduce or increase the hours of work, depending on the relative strength of the income and substitution effects. It will be interesting and useful to find out whether the labour supply response of a developing country, with socio-economic and institutional characteristics that differ from developed countries, corresponds with the general findings of empirical studies mainly conducted in the West.

Almost all the empirical studies on labour supply with taxation are performed for the developed countries. Hardly any study of this nature have been conducted for the developing countries, thereby making the study by Rochjadi and Leuthold (1994) on Indonesia a rare exception. There are several reasons to explain the scarcity of empirical labour supply studies with taxation in developing countries. First, most of the available data are in aggregate form. Second, consistent with the high rates of unemployment and low wages in developing countries, the focus of many labour studies is on labour market segmentation and unemployment. Among the common themes of studies in developing countries are labour market structure and segmentation, the unemployment and underemployment problems, and rural-urban migration within the Arthur Lewis or Harris-Todaro frameworks. These studies usually adopt an interdisciplinary approach to the problems of poverty, low literacy rates, high fertility and environmental deterioration. A study on labour supply with taxation in Malaysia will, therefore, be a step in filling in this gap in the field of knowledge.

In examining the literature on labour supply modelling, this chapter first surveys the first and second generation studies conducted in this area, tracing the estimation problems and the procedures adopted to overcome them. It then presents the results of empirical studies along with some factors that could account for the wide disparity in estimates among the two generations of studies. Next, it examines the specification of taxes in labour supply modelling and the two common approaches used for parameters estimation. This is followed by a discussion on the importance of taxes in affecting labour supply based on empirical findings from studies conducted in the developed countries. The chapter finally examines the limited empirical work done on labour supply in developing countries, especially in Malaysia and Indonesia.

2. LITERATURE SURVEY ON STATIC LABOUR SUPPLY MODELS

2.1 First Generation Studies

There exists a large volume of empirical studies using the static labour supply models especially in the last 30 years.[1] One of the important lesson that has emerged is that the quality of empirical results is sensitive to the model specification and estimation techniques used. Labour supply parameter estimates should in principle be based on sound theory and careful structural analysis rather than on *ad hoc* models. The early

[1] For some excellent surveys on this topic, see Heckman, Killingsworth and MaCurdy (1981), Killingsworth (1983), and Heckman (1993).

empirical studies used the ordinary least squares method (OLS), but many techniques have been developed later to overcome the inadequacy of this method in dealing with econometric problems such as selectivity, endogeneity, and errors arising from measurement, optimisation and heterogeneous preferences in the model.

Empirical labour supply research are often divided into first and second generation studies. The *first generation* empirical studies began from the 1930s to about 1974. Since the pioneering work of Schoenberg and Douglas (1937) on labour force participation, most empirical work on labour supply have been based on the neo-classical analysis of individual choice (Heckman, Killingsworth, and MaCurdy, 1981). Analysts used OLS to calculate the substitution and income elasticities. The general conclusion is that women are more sensitive than men to changes in wages and income.

A collection of first generation studies using advanced techniques on micro data is contained in the book, *Income Maintenance and Labor Supply*, edited by Cain and Watts (1973). These studies are concerned with the effects of different variables on labour supply and the work response of non-poor groups in the population. This book, which brings together seven research papers,[2] reflects the econometric concerns and weaknesses of first generation work and introduces a number of econometric and methodological innovations. The empirical findings of these studies correspond with the other first generation research in concluding that female labour supply is more sensitive to changes in wage rates and property income than is male labour supply. Furthermore, leisure is a normal good for both male and female, and the compensated substitution effect of an increase in wage will raise labour supply. Male labour supply schedule appears to be sloping gently backwards with respect to wage, while the female schedule is strongly positively sloped.

In their concluding chapter, Cain and Watts examine the fundamental methodological problems faced by the studies and raised some points that set in place the agenda for second generation research on labour supply. Since the points raised have an

[2] The authors of the seven papers are: (a) Robert E. Hall, (b) Michael J. Boskin, (c) C. Russell Hill, (d) Irwin Garfinkel, (e) David H. Greenberg and Marvin Kosters, (f) Orley Ashenfelter and James Heckman, and (g) Belton M. Fleisher, Donald O. Parsons and Richard D. Porter.

important bearing on the direction of future studies, it may be useful to outline these issues.

1. *Sample selection.* Many of the studies on income-maintenance programme eliminated from the sample all groups above the poverty line. This data truncation introduces biases in the resulting estimates of income and wage effects on labour supply.

2. *Choice of the dependent variable.* Labour supply can be represented by either hours of work or labour participation. Both measures generate different elasticity estimates even if the same data set is used.

3. *Specification and measurement of independent variables.* The problems raised include the simultaneity problem between wage and hours of work, omitted variables (such as preference for work, personal traits, quality of education and work experience, etc.) that could potentially cause bias in the measure of wage and income effects, and measurement errors in the wage variable and income reporting.

4. *Dealing with non-participants.* There is the problem of how to deal with missing wages of non-workers and their zero hours of work.

First generation studies generally ignore the underlying sources of error. The error term is assumed to be random and the studies gave no consideration whether the error is generated by measurement error or omitted regressors. In later studies by Burtless and Hausman (1978), Hausman (1979) and Blomquist (1983), the model specifications take account of some of the errors, whether they are attributable to missing variables only, or errors in measuring hours, or both. Another problem with most first generation studies is that they do not make clear the distinction between (a) decisions on participation and employment, which is a dichotomous choice variable, and (b) decisions on the number of work hours.[3] An appreciation of the participation-hours of work dichotomy is tied up with the issue of selection bias.

[3] The studies by Boskin (1973) and Kalachek and Raines (1970) are exceptions since they deal with the labour supply decision in two stages: participation and hours of work.

In principle, the parameter estimates of labour supply models provide information on different aspects of labour supply. Four different labour supply functions are confused in earlier literature (Heckman, 1993; Killingsworth, 1983). They are:

$$\mathrm{E}\,(H \mid W, Y, \varepsilon) \tag{1}$$

$$\mathrm{E}\,(H \mid W, Y, H > 0) \tag{2}$$

$$\Pr\,(H > 0 \mid W, Y) \tag{3}$$

$$\mathrm{E}\,(H \mid W, Y) = \mathrm{E}\,(H \mid W, Y, H > 0) \times \Pr\,(H > 0 \mid W, Y) \tag{4}$$

where H is hours of work, W is wage, Y is non-labour income and ε is a non-random error term to capture individual differences in work preference and reservation wage. [4] Equation 1 is the conditional expectation of H given wage, non-labour income and ε. It is the structural labour supply equation that yields the standard neo-classical income and substitution effects of labour supply. Equation 2 is the labour supply of workers which describes an empirical relationship but does not control for 'taste for work'. The probability of participation or employment is given in equation 3, while Equation 4 is an aggregate labour supply curve conditional on W and Y. Heckman (1993: 117) argues the case for making clear the distinction between participation and hours because this distinction is a 'legacy of the research conducted on labor supply over the past 20 years.' Once the distinction is made, the problem of missing wages for non-workers which was regarded as somewhat a nuisance by earlier literature became a central research problem in economics, i.e. the issue of self-selection bias in estimating wage and labour supply functions on samples of workers.

2.2 Second Generation Studies

The methodological approach for the second generation studies is, firstly, to develop theoretical models which set out in detail the various structural aspects of labour supply decision, and secondly, to develop the statistical procedures for estimating labour supply parameters. Briefly, the approach adopts a functional form for the individual's preference structure that could be specified in terms of direct utility function or some

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[4] The reservation wage is the asking wage of an individual who is only willing to accept a job if the offer wage is above it. If the offer wage is equal or less than the reservation wage, the individual would prefer not to work.

related function, such as the marginal rate of substitution or the indirect utility function. The budget line is considered specifically and the individual's utility is evaluated at each point of the budget line to obtain the point which yields the highest utility. The equilibrium can be a corner solution, interior solution, or on a kink. The non-random error ε associated with the reservation wage and participation decision of workers and non-workers is specifically considered in the model. The term ε is assumed to arise from factors known to the individual who is making the decision of whether to participate or not, but is unknown to the analyst. The error term is also affected by the unobserved components associated with both sides of the labour supply equations, such as error in measuring hours of work H and omitted explanatory variables.

Addressing the problem of selectivity is an innovation in second generation research. Hours and wage data are available for workers but not for non-workers. The issue is how to treat missing wages for non-workers in parameter estimation. First generation studies used two approaches to treat non-workers. In the first approach, non-workers were included in the sample, with their values of H set to zero, which is generally referred to as Procedure I.[5] This creates a misspecification problem. In the utility maximisation model, an individual will work if his/her offer wage exceeds the reservation wage. When this happens we observe positive number of hours. When $H = 0$ we can only deduce that the offer wage is less or equal to the reservation wage. Individuals have a range of reservation wage unknown to the analyst. When we include non-workers in the sample and maximise utility by equating the marginal rate of substitution (MRS) with real wage in our model, we are assuming that the non-workers choose $H = 0$ in the same way workers choose their positive values of H. This clearly constitute a misspecification problem.

The second approach adopted in first generation work is Procedure II which excludes non-workers from the sample when estimating hours of work. This gives rise to the sample selection bias problem, which is more acute for females than males because of the lower rate of participation among females The exclusion of non-workers results in

[5] In Chapter 4 of *Labor Supply*, Killingsworth (1983) describes eight procedures commonly used in first generation and second generation work on static labour supply modelling. The procedures are numbered from I to VIII. Procedures I and II are used in first generation research, while the remaining six procedures, which are econometrically more sophisticated, are used in second generation research.

the non-random selection of the error term. As a result of the censorship, wage and non-labour income variables used in the model are correlated with the error term. The parameter estimates with the excluded non-workers will give rise to inconsistent estimators of the total labour supply parameters. The assumption here is that the non-workers who are excluded from the estimation differ in characteristics from the workers. There are some reasons why this might be the case. Workers are those for whom the offer wage is higher than the reservation wage. This implies that workers can either attract a high market wage or they have low asking wage. Hence, workers are unlikely to be representative of the entire population. An exception where sample selection bias is not a problem is when everyone in the population works, say, in the case of prime-age males in an economy with full employment.

The distinguishing feature that separates the first and second generation studies is that the latter pays more attention to specification and estimation issues. Unlike first generation studies, second generation work estimates the labour supply parameters by maximising an explicit utility function subject to budget constraints. In other words, the labour supply parameter estimates are based on microeconomic foundations rather than on *ad hoc* models.[6] In addition, second generation work has also carefully distinguished different aspects of labour supply, such as participation and hours of work. Modelling for participation is a crucial stage in dealing with sample selection bias.

An approach to deal with sample selection bias has been introduced by Heckman (1976, 1979). This approach presents a consistent two-stage estimation method that eliminates the specification error in the case of censored samples. It can be shown that the conditional mean of ε_{Hi}[7] is as follows:

$$K_i = \sigma_H \lambda_i \qquad (5)$$

where $\lambda_i = f(-J_i/\sigma_H)/[1 - F(-J_i/\sigma_H)]$. The term λ_i is the inverse Mill's ratio that is obtained by performing a probit estimate on participation for all observations, workers

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[6] An excellent exposition on the specification of labour supply functions used in second generation research is given in Stern (1986). Among the many criteria mentioned in choosing a functional form for a labour supply function are: consistency with utility theory; convenience in estimation; ease of calculation; ease of use in applied policy problems; facility of computation; behaviour of labour supply at low levels of work; aggregation; and flexibility in possible response of labour to changes in the wage.

[7] ε_{Hi} is the error term associated with the heterogenous preference for work, which is assumed to be normally distributed with mean zero and standard deviation σ_H.

and non-workers alike. The terms f and F refer to the standard normal and cumulative normal density functions, respectively. The inclusion of λ_i in the regression would yield consistent estimate of the coefficients in the hours of work equation, even when the sample is restricted to workers.

3. EMPIRICAL RESULTS

Table 6.1 summarises the range of elasticities from first generation work. The empirical results of first-generation studies of labour supply show a wide range of estimates that is perhaps too large for analytical or policy purpose. Even the elasticities in Cain and Watts vary widely. The elasticity estimates suggest that the introduction of Negative Income Tax scheme in the United States could bring about a reduction of between 4 to 40 hours, depending on the elasticity estimates used for the simulation. The large disparity in the elasticities was noted with some concern in Cain and Watts since this implies an unacceptably wide range of reduction in labour supply arising from the income-maintenance plan.[8]

TABLE 6.1 SUMMARY OF LABOUR SUPPLY ELASTICITIES IN FIRST GENERATION STUDIES

	Gross own-wage elasticity	*Compensated own-wage elasticity*	*Compensated spouse's wage rate*[1]	*Property income*[2]
Males	−0.45 to + 0.55	−0.05 to +0.96	0 or < 0	0 to −0.16
Females	−0.10 to +1.60	−0.05 to +2.00	0 to −0.40	−0.1 to −0.75

[1] Cross-substitution effect expressed as an elasticity
[2] Elasticity of hours of work with respect to property income

Source: Heckman, Killingsworth, MaCurdy (1981: Table 1.1)

[8] The largest substitution elasticity evaluated at the mean is 0.5 as reported by Hill (1973), while the smallest are close to zero if we ignore a few cases of negative substitution elasticities. Hill's estimate is still smaller than Kalachek and Raines (1970) who report a much larger elasticity of substitution of 0.9. The income elasticites are negative and range between 0 and -0.8.

Despite methodological improvements in the second generation procedures, they do not manage to narrow the range of elasticity estimates.[9] There were more studies on female labour supply in second-generation studies than on male labour supply. The few studies on male labour supply indicate that male labour supply is less sensitive to wage rates and property income than female labour supply. According to Killingsworth (1983), most of the second-generation studies imply that the gross wage elasticities range between –0.20 and +0.14 for males and –0.32 to +15.0 for females. The compensated wage elasticities range from –0.06 to +1.00 for males and from –1.06 to +14.79 for females. However, Killingsworth argues that when studies with negative compensated elasticities are discarded, this narrows the range of uncompensated elasticities for U.S. men to –0.03 to 0.14. The anomaly to these findings is the results reported by Nakamura, Nakamura, and Cullen (1979, for Canadian women) and Nakamura and Nakamura (1981, for both Canadian and US women). Their results depart from the other first- and second-generation research by showing that the uncompensated wage elasticities for female hours of work are negative.

It has been argued that differences in estimation method, functional form and data base of the various studies account for the wide heterogeneity of elasticity estimates. In the seventies and eighties, there were some studies using a similar data set to test the sensitivity of different estimation procedures and assumptions. DaVanzo, DeTray and Greenberg (1973) applied many different procedures to the 1976 Survey of Economic Opportunity (SEO) data set in the United States. Another sensitivity study was performed by Masters and Garfinkel (1977) who pursued the same research question using the data from the 1967 SEO and the 1972 Michigan Panel Study of Income Dynamics (PSID). The two studies conclude that the wide diversity of results are the outcome of some of the following factors:[10]

1. *Problems in measuring the hours and wage rate variables.* Several definitions of hours worked have been used in different studies. Since hours worked is often used in calculating the wage rate, errors in measuring true hours worked

[9] For a listing of the estimates of structural elasticities derived in second-generation research, see Table 4.3 in Killingsworth (1983).

[10] Pencavel (1986) and Fallon and Verry (1988: 60-64) provide some elaboration on the problems of measurement and definitions of variables.

induce a spurious negative correlation between the two variables. In tax analysis, the tax liability used to calculate net wage is based on official income tax schedule which is unlikely to conform to the actual tax paid by the individual since the analyst does not know the exact amount of tax deductions and the extent of tax avoidance and tax evasion in the system.

2. *Difficulty in measuring non-wage income accurately.* Different procedures are used in the calculation of non-wage income that give rise to the wide range of non-wage income effects estimated in the various models. It is not uncommon for studies to report a positive association between non-wage income and hours of work. Of the 57 different estimated coefficients on non-wage income reported in DaVanzo, DeTray and Greenberg, only 16 are significant; of these, half of the estimates have positive signs while the other half negative signs.

3. *Effect of other explanatory variables.* Some of the explanatory variables used in the models include age, education, work experience, family size and structure, region, job satisfaction, state of health, etc. DaVanzo *et al.* found that the size and signs of the wage coefficient are extremely sensitive to the presence of years of schooling. Studies that include education and number of dependants as the explanatory variables for the hours of work equation show a significant positive relation relationship between these variables and hours of work.

In the eighties, an influential sensitivity analysis was undertaken by Thomas Mroz (1987) on the 1976 Panel Study of Income Dynamics data set. Using a sample consisting of 753 white married women aged 30-60, he conducted a detailed sensitivity analyses using the alternative first- and second-generation estimation methods. His simulation exercises show the sensitivity of elasticity estimates to the choice of instruments and endogeneity assumptions.

As a baseline approach, Mroz uses OLS to estimate the hours equation on a sample of those who work (428 women in the sample were working in 1975). This approach is often used in first generation work and is referred to as Procedure II by

Killingsworth. This procedure yields negative elasticities for both the uncompensated wage effect (–0.0113) and income effect (–0.0028), while the inclusion of the variable children under age six reduces hours of work substantially. It was pointed out that a negative wage effect can arise if there is a random measurement error in hours of work which causes a spurious negative relationship between hours of work and wages. As a variant to Procedure II, Mroz uses the women's labour market experience[11] as an instrumental variable for wage, which is regarded an endogenous variable. By using the two stage least squares (2SLS) method, the estimate for the uncompensated wage response becomes positive and significant, while the income effect is negative and large. By excluding the experience variable as an instrument, the uncompensated wage elasticity and the income elasticity decrease in size while still retaining their signs. Mroz performs exogeneity tests for experience, children and non-wage income and concludes that labour market experience is not exogenous in the labour supply equation. He, however, cannot reject the exogeneity of children and non-wage income.

The procedure II described above is based on a subsample of working women and does not control for self-selection bias. To examine the importance of self-selection bias, Mroz uses the Heckit multistage approach or Procedure VIII. He calculates the inverse Mills ratio λ from the probit model. The wage variable is instrumented and used in the 2SLS estimation of the hours worked equation. The regression yields a small positive uncompensated wage effect and a small positive income effect. The statistics are significant when labour market experience are excluded from the model but are insignificant with the inclusion of experience. Mroz concludes that the estimated uncompensated wage effect is positive but very small and the income effect is negative and small. This result also challenges the conventional wisdom that the wage and income elasticities for women are larger than of men and, therefore, concurs with Nakamura and Nakamura (1981).

[11] The measure of labour market experience used in this study is the number of years the woman worked for money since her eighteenth birthday. Mroz (1987: 774) argues that women who have worked many years in the past tend to have higher wages and work more hours in the present. The number of years worked between two women reflects a systematic difference in the unobservables influencing their labour supplies (e.g. 'tastes for work'), which makes women's labour market experience endogenous to the labour supply function.

4. Taxes and Labour Supply

The incorporation of taxes in labour supply estimation is an extension of basic labour supply model. In the basic labour supply model, the budget constraint is depicted by a straight line with the slope $-w$ that intersects the vertical axis on the right hand side at Y. The preferred hours of work, H^*, is where the individual's indifference curve I_1 is tangent to the budget line YW_B at A (see Figure 6.1). The effect of taxation on labour supply is to lower the after-tax wage or net wage. In the proportional tax system, the application of the tax rate τ will lower the post-tax wage to $w_t = w(1-\tau)$ and the budget line rotates from YW_B to YW_A. Only labour income is taxed and not non-labour income. The new utility-maximising equilibrium is now at point C where the indifference curve I_2 is tangent to the budget constraint YW_1. Hours of work decline from H^* to H_2.

This decline is a combination of two effects. The movement around the original indifference curve I_1 from A to B shows the substitution effect as a result of the change in the price of leisure relative to market work, holding utility constant. In this case, the opportunity cost of leisure has fallen relative to market work, thereby encouraging the worker to consume more leisure and reduce the hours of work from H^* to H_1. The movement from B to C denotes the income effect, reflecting the worker's response to a decline in real income as a result of income tax. If leisure is assumed to be a normal good, the worker would reduce the consumption of leisure and increase the amount of hours worked from H_1 to H_2.

Using the Slutsky equation, the response in the hours of work will be determined by both the income and substitution effects as follows:

$$\frac{dh}{dw} = \left.\frac{\partial h}{\partial w}\right|_{u=\bar{u}} + h\frac{\partial h}{\partial y} \tag{6}$$

The first term on the right hand side is the compensated substitution effect holding utility constant. According to theory, the sign of the substitution effect is positive since a

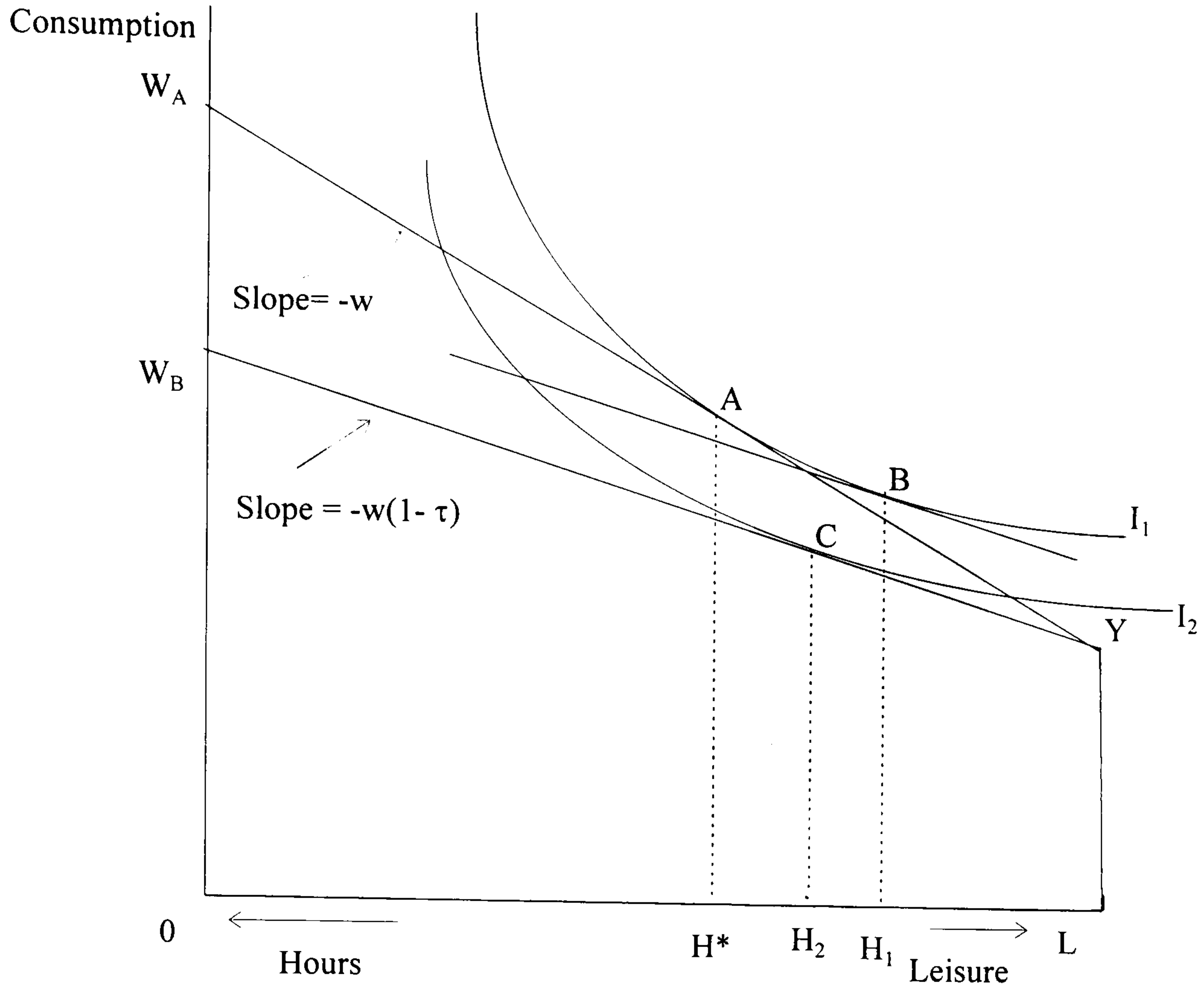


FIGURE 6.1 THE EFFECTS OF PROPORTIONAL TAX ON THE BUDGET CONSTRAINT

decline in wage rate (as a result of tax increase) will reduce the price of leisure, making it relatively cheaper. Workers are inclined to choose more leisure and put in less hours of work. Therefore, with the substitution effect, a fall in wage rate as a result of tax increase is accompanied by a decline in hours of work. The second term on the right hand side of the equation is the income effect. Since leisure is assumed to be a normal good, the demand for it declines with a reduction in real income. Therefore, a decline in wage rate is accompanied with an increase in hours of work.

Although the majority of the first and generation studies produce elasticity results that have the 'right' signs according to theory, some of the empirical results also produce signs that go the opposite way. When this happens, they are sometimes dismissed on grounds that the estimation procedure might be suspect or there are some measurement errors or endogeneity problems not addressed by the model (see, for instance, Killingsworth, 1983: 128-129, 185, 200). One may reasonably ask whether there is a need to probe deeper into the reasons for these results rather than quickly dismissing them as estimation or measurement errors.

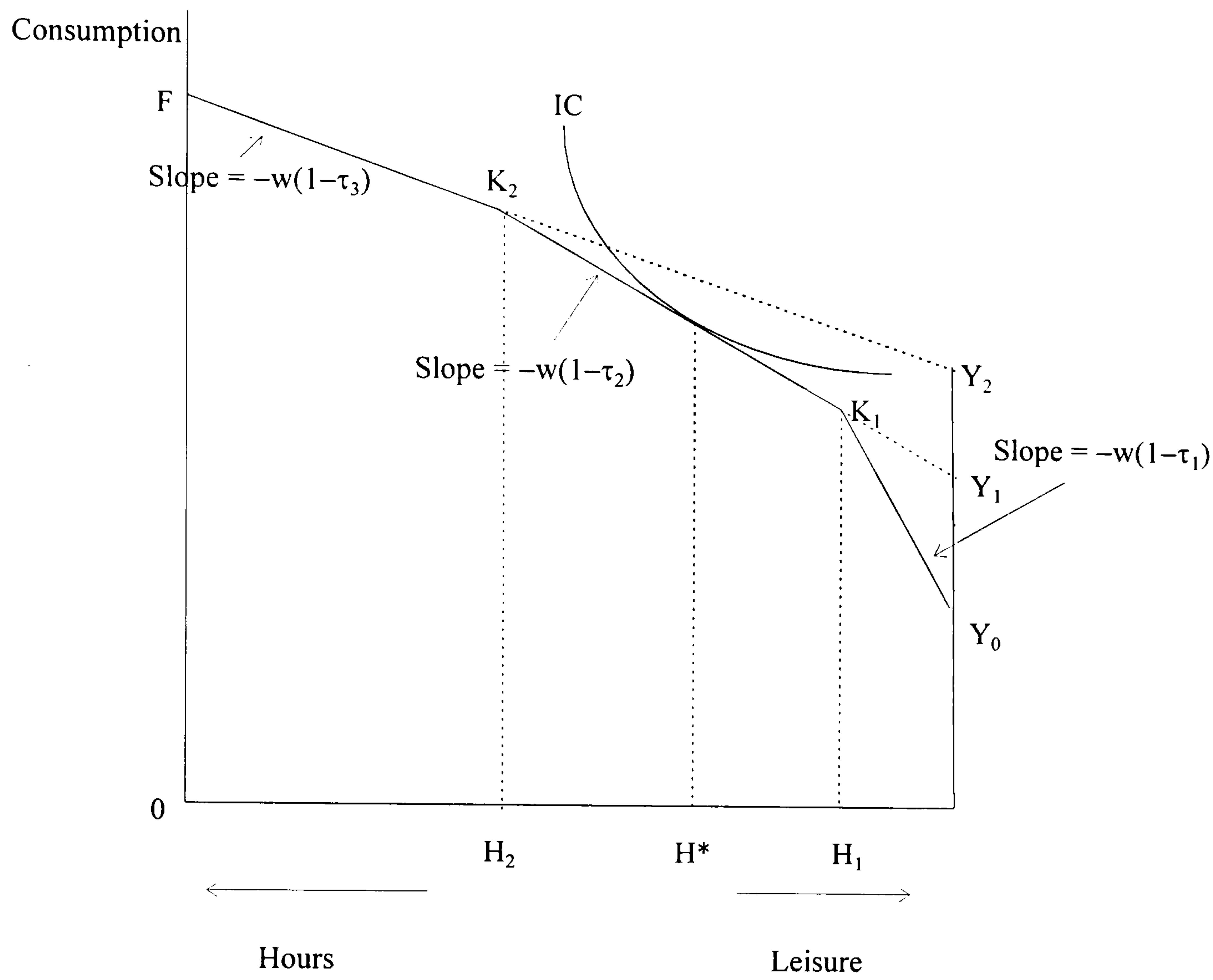


FIGURE 6.2 THE EFFECTS OF VARYING MARGINAL TAX RATES ON THE BUDGET CONSTRAINT

In a *progressive tax system*, the budget set is convex and piecewise-linear (Figure 6.2). Let us assume that there are three tax rates and three after-tax wages. If an individual works up to H_1 hours, the marginal after-tax wage is $w(1-\tau_1)$. As the individual increases the amount of work hours and earns more wage income, he or she moves into successively higher tax brackets. Accordingly, the marginal after-tax wage rates are $w(1-\tau_2)$ for hours worked between H_1 and H_2 hours and $w(1-\tau_3)$ for hours above H_2. The linear budget segments become flatter with increasing marginal tax rates $\tau_3 > \tau_2 > \tau_1$. The kinks on the budget set occur at the points of transition, where the marginal tax rates change from τ_1 to τ_2 and from τ_2 to τ_3, which correspond with hours worked H_1 and H_2 on the horizontal axis. Under progressive taxation, the preferred hours of work is unique and is given by the point of tangency between the indifference curve and the budget set. Since the budget set is convex, the tangency represents the global optimum if desired hours are positive. If, however, there are welfare programmes for

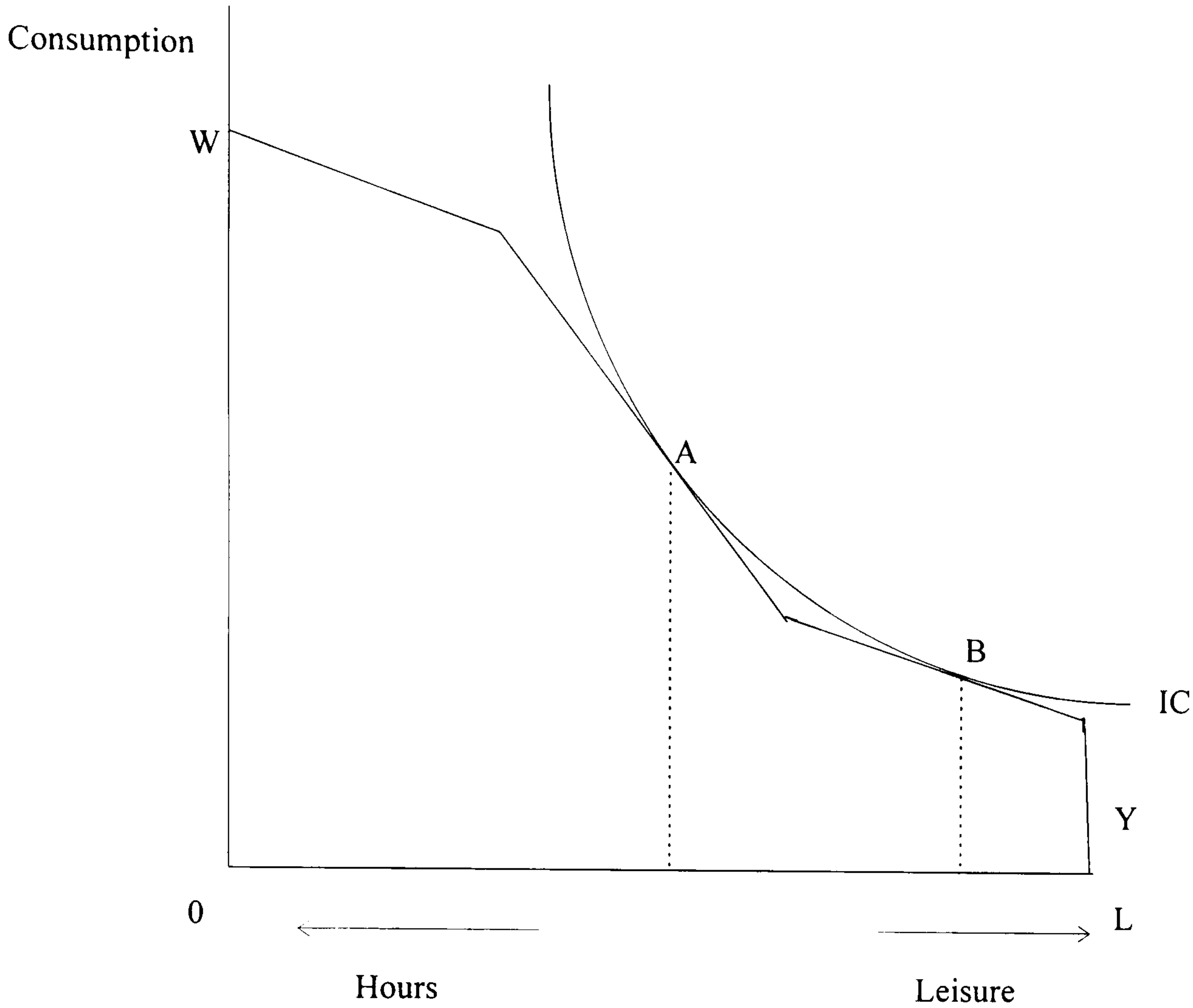


FIGURE 6.3 MULTIPLE TANGENCIES IN A NON-CONCAVE BUDGET SET

those in the low income category, the budget set is no longer strictly convex and can result in multiple tangencies. In Figure 6.3, the indifference curve is tangent to the budget constraint *YW* at two points, *A* and *B*. In this case, small changes in the wage, tax or benefit system can bring about large changes in the desired hours of work due to the possibility of skipping entire budget segments (Hausman, 1985). Among some studies that address the data analysis issues of the kinked budget set arising from social security systems are Burtless and Moffitt (1984, 1985) and Blundell, Meghir, Symons and Walker (1988).

There are two difficulties involved in the estimation of progressive taxation. First, as Hausman (1985) observes that if non-labour income is affected by the tax rate, then there is another income effect on hours worked. The complete equation is

$$\frac{dH}{d\tau} = \left.\frac{\partial H}{\partial \varpi}\right|_{u=u} \frac{d\varpi}{d\tau} + H\frac{\partial H}{\partial Y} + \frac{\partial H}{\partial Y}\frac{dY}{d\tau} \qquad (7)$$

where H is hours worked, τ is marginal tax rate, ϖ is net wage after tax, and Y is non-labour income. This implies that in estimating the effect of taxes on labour supply in a progressive tax system, the income and substitution effects of the changes in both wage and income should be considered.

The difficulty involved in the estimation of progressive taxation is finding the point of tangency on a curved budget set. Under progressive taxation, the budget set is convex and a global optimum can be found as a corner solution, at a budget segment or even at one of the kinks. Moffitt (1990) provides a good discussion of some methods that could be used in estimating a non-linear budget set. There are two common approaches have been used in the literature used for analysing labour supply with taxation. First, is the Piecewise-Linear Budget Constraint approach that had been used in studies such as Burtless and Hausman (1978), Wales and Woodland (1979), Flood and MaCurdy (1992), and Blomquist (1996). The second approach is the Instrumental Variable method that is used in Boskin (1973), Hall (1973), Mroz (1987), Flood and MaCurdy (1992) and Blomquist (1996). However, before elaborating on the two commonly used approaches, it will be useful to explain the concept and derivation of the 'virtual income', a device that is used by both approaches to overcome the difficulty of finding the maximum on a convex budget set.

Virtual income refers to the proxy non-labour income that results from extending a given budget segment to the vertical axis on the right hand side. This device is used by analysts during the last two decades ranging from Rosen (1976), Hausman (1981a) to Flood and MaCurdy (1992) and Blomquist (1996). The intersection of the extended linear budget segment with the vertical axis gives the level of virtual income. It is the assumed level of property income that corresponds with the marginal wage rate applicable to the individual. In Figure 6.2, the virtual income corresponding with the marginal tax rates τ_2 and τ_3 are Y_1 and Y_2, respectively.

4.1 Piecewise-Linear Budget Constraint Approach

Sometimes dubbed the Hausman Method, this approach was used by Burtless and Hausman (1978) to study the labour supply effects of a negative income tax and the federal income which creates a budget constraint that is not strictly convex. Hausman

(1979, 1981a) provide details on this approach which are further elaborated by Blomquist (1983), Moffitt (1990), and Flood and MaCurdy (1992). The econometric estimation allows for two error terms. The first error term is to represent unobserved heterogeneity of preferences since different individuals will choose to work different amount of hours even if they face the same budget constraint. The second error term represents optimisation error which arises because individuals cannot choose their hours of work precisely even if they wish to locate at a particular point on the budget constraint. Although measurement error is conceptually different from optimisation error, this model does not make an econometric distinction between the two types of errors.

To illustrate the model, let H be hours of work, $W(1-\tau_1)$ and $W(1-\tau_2)$ be the net wage on segments 1 and 2, τ_1 and τ_2 are the corresponding marginal tax rates, y_1 and y_2 are the intercepts or virtual income for the first and second segments, and H^* hours of work be the kink. Let υ be the heterogeneity error term and ε be the optimisation error. The equations describing the hours of work an individual would have under each of the three possible locations which would maximise his or her utility are as follows:

$$H = \alpha + \beta W(1-\tau_1) + \gamma y_1 + \upsilon + \varepsilon \qquad \text{if utility is max. on segment 1}$$

$$H = \alpha + \beta W(1-\tau_2) + \gamma y_2 + \upsilon + \varepsilon \qquad \text{if utility is max. on segment 2}$$

$$H = H^* + \varepsilon \qquad \text{if utility is max. on the kink}$$

The equations that describe the choice of segment or kink that would maximise utility are as follows:

$$\text{Segment 1 if} \qquad \alpha + \beta W(1-\tau_1) + \gamma y_1 + \upsilon < H^* \tag{8}$$

$$\text{Segment 2 if} \qquad \alpha + \beta W(1-\tau_2) + \gamma y_2 + \upsilon > H^* \tag{9}$$

$$\text{Kink if} \qquad \alpha + \beta W(1-\tau_1) + \gamma y_1 + \upsilon > H^* \tag{10}$$

$$\text{and} \qquad \alpha + \beta W(1-\tau_2) + \gamma y_2 + \upsilon < H^*$$

The distribution of the error terms are assumed to be normal and the studies using this approach estimate the equation coefficients by maximum likelihood. The parameters are estimated using an iterative algorithm. First, the estimation procedure checks if utility is maximised by a corner solution where H = H_0. If it is not, the procedure checks whether the maximum lies on the first segment where desired hours is less than H^*. If this is not the case, then the procedure checks whether the maximum lies on the second segment where desired hours is greater than H^*. Hence, individuals with lower values of υ would choose the first segment and individuals with higher values of υ would choose the second segment. If utility is not maximised at the two segments, the maximum is assumed to lie on the kink where υ falls between the high and low values. This iterative method searches all possible parameter values that would maximise utility for all observations in the sample.

The model can be estimated with only one error term. In studying the effect on income tax on labour supply, Wales and Woodland (1979) estimate the model with optimisation error ε but do not include the heterogeneity error υ, which suggests that individuals with the same budget constraint are maximising at the same points. Some other studies such as Hausman (1980), Zabalza, Pissarides and Barton (1980), and Moffitt and Nicholson (1982) adopted the model which includes the heterogeneity error but not the optimisation error. The assumption here is that individuals could locate at the kink points without any error. As Moffitt (1990: 136) observes, the implication of the model with the optimisation error is that the observed segment location for an individual need not necessary be the location where he or she maximises utility.

When the tax system is *not strictly progressive*, especially in the presence of government transfer programmes, the analysis becomes more complicated because the budget set is no longer convex. This gives rise to the possibility of multiple tangencies between the indifference curves at the budget set. Hausman (1985) describes how the estimation can be done. The labour supply function can be derived from the indirect utility function by using Roy's identity. The global optimum can be found by comparing all feasible tangencies and the tangency with highest utility is chosen as the preferred hours of work. Either the non-linear least squares or a Tobit procedure could be used to estimate the unknown coefficients, as with the case of the convex budget set.

The Hausman method provides an elegant solution to the parameter estimation of the labour supply function. It takes into account the linear segments and kinks on the after-tax budget set as well as admits randomness in hours of work arising from both the measurement error and the variation in individual preference. It also takes into account the endogeneity of the marginal tax rate in estimation. However, there are some shortcomings that can affect the reliability of the estimates. The empirical studies of male labour supply using the Hausman approach tend to produce higher substitution and lower income effects than empirical work based on other approaches, thereby producing larger estimates of both labour-supply responses and dead-weight losses associated with the progressivity of taxation (Heckman, 1983; MaCurdy *et al.*, 1990).

The Hausman method assumes that there is perfect knowledge on the part of the analyst and the individual with regard to the entire budget constraint. The assumption is that the analyst is able to observe perfectly the wage and income variables and the model makes no allowance for errors in measuring the budget constraint. This assumption is most likely to be violated in empirical analysis. The true budget set is not known to the econometrician because of measurement errors, including those made in tax computations as a result of unobserved variability in deductions and exemptions. Without full accounting of the variability, Heckman (1983: 73-74) argues that the piecewise-linear budget constraint procedure does not produce consistent estimates and may be less robust than the earlier instrumental variable estimation procedures of Boskin (1973) and Hall (1973).

In addition, the Hausman method makes very strong exogeneity assumptions in presuming that all variables, including gross wages and non-labour income, used in the calculation of taxes are exogenous determinants of labour supply behaviour. Some authors such as Da Vanzo, De Tray and Greenberg (1976), Pencavel (1986), and Flood and MaCurdy (1992) argue that wages and income are endogenous variables. If this is the case, the substitution and income effects obtained from this method may not be dependable.

Finally, a major problem with this approach is the parametric restriction adopted that constraints the signs of the substitution and income effects. MaCurdy, Green, and Paarsch (1990) observe that requiring the Slutsky condition to hold at various points is not based on economic theory but, in the case of this procedure, on the need to obtain a properly defined statistical model. This inequality restrictions must hold in order for the likelihood functions, which are used in deriving the maximum on the linear segments of the budget constraint, to be defined. To satisfy globally the Slutsky condition, the inequality constraints are:

$$\partial H / \partial \varpi \big|_{u} = \partial H / \partial \varpi - H(\partial H / \partial Y) > 0 \qquad (11)$$

Since $\delta H/\delta\omega = \alpha$ and $\delta H/\delta Y = \beta$, we obtain

$$\alpha - \beta H_{ij} > 0, \forall_i$$

where H_{ij} represents the hours-of-work values corresponding to the interior kink points j on an individual i's budget set, ω is the wage after tax, and Y is the intercept or virtual income. This implies that the condition $\alpha > 0$ must be fulfilled if labour supply is to be defined within $0 \leq H \leq H_{max}$. This method imposes the assumption that leisure is a normal good which means that $\beta < 0$. Since these conditions are imposed at the start of the estimation procedure, it is hardly surprising that studies using this method had a positive sign for wage substitution effect and a negative sign for the income effect, i.e. having signs in the 'right direction.' According to Heckman (1983), these restrictions are not justified because there is a long-standing empirical controversy surround the sign of the income effect (β).

In previous research where β is not restricted, the studies sometimes produce negative substitution effects and zero or positive income responses. This is also what we discover from the Malaysian data, as we shall see in Chapter 7. The two reasons given to explain why the signs go the 'other direction' are: (a) the correlation between preferences for work and savings, and (b) the endogeneity of assets in a life-cycle model of labour supply. The taste variation regarding the process of asset accumulation can be a serious source of bias. Greenberg and Kosters (1973) argue that some individuals who prefer to acquire assets tend to work longer hours to achieve their desired asset levels. In their study, they attempt to control for differences in preference structures in estimating wealth effects on labour supply.

Another approach to address the weakness of the basic labour supply models is adopted by Smith (1980) who argues that a weakness in the use of asset in labour supply models is the lack of emphasis on the life-cycle dimension. Smith develops a life cycle-model to explore the relationships between working hours and assets. This approach shows that both the variables are simultaneously determined by similar economic forces, and the correlation between them should not be interpreted as evidence of a causal sequence from assets to market work. As Smith argues, the standard practice of using assets to measure wealth effects on the demand for leisure is theoretically inappropriate since it overlooks or lack emphasis on the life-cycle approach. They have to be considered in a multiperiod model instead of being forced into the confines of a one-period model.

4.2 Instrumental Variable Approach

This is another method that is often used in labour supply studies. In the past, analysts had tried to estimate the labour supply parameters by linearising the budget constraint around the optimum point and used net wage and virtual income as independent variables in the Ordinary Least Squares (OLS) procedure. However, using OLS on the linearised model will generate inconsistent estimates as a result of either heterogeneous preferences or measurement/optimisation errors or both. In first generation research, OLS is applied to the labour supply function

$$H_i = g(W_i, V_i) + \varepsilon_i$$

where H_i is the individual's observed quantity demanded, W_i is the individual's wage, V_i is the individual's virtual income for that segment, and ε_i is the error term. This approach can give rise to biases because of the problems of endogeneity and reverse causality. The right-hand side variables for wage and virtual income are endogenous because they are partly determined by the individual when he or she makes the choice of labour supply. In other words, wage and virtual income are partly determined by hours of work. Hence, the causality runs from the choice of hours to the choice of wage and virtual income, rather than the other way round. This approach does not take into account the problem of individuals locating at the kinks, which can be a problem if there is the tendency of workers to do this as a way of reducing their tax burden.

To get around the reverse causality problem, the instrumental variables techniques have been used in studies that have linearised the slope and used it along with the intercept as independent variables in the regression equation. The method is essentially to construct an instrumental variable that is correlated with the endogenous regressor variable but uncorrelated with the error term. In this case, the analyst tries to develop instrumental variables for the wage and virtual income variables that are exogenous but are uncorrelated with the error term. This approach is equivalent to the technique used in getting around the simultaneous equation problem where there is a two-way relationship between the variables on the left- and right-hand side of the regression equation and where the right-hand side variable is correlated with the error term. The choice of instrument set varies across studies which adopt different assumptions on exogeneity.

Among the first attempts to use the instrumental variable approach are Boskin (1973) and Hall (1973). In cross section studies, the observed wage, W, may differ from the true wage, W_i^*, by a random error of measurement, υ. In addition, the wage rate is often calculated by dividing total earnings on hours of work. This implies that errors in measuring hours of work are transmitted to the wage variable which will be related to the error term, giving rise to biased, even inconsistent, estimate of β. To overcome this problem of wage measurement, Boskin and Hall use the instrumental variable estimator, which is expressed in terms of observable personal characteristics.

A different approach is adopted in Rosen's (1976) study on the effect of the federal income tax and Hausman and Wise's (1976) study on the effect of a negative income tax. The marginal tax rate was evaluated at the same level of hours of work (i.e. at 40 hours per week) for all individuals in order to construct net wage rates and virtual incomes. The rationale for this procedure is that since the net wage variable is not constructed on the basis of actual, chosen hours of work, it is uncorrelated with the error term in the labour supply equation. This approach faces the problem of partly misrepresenting the actual tax rate faced by individuals who do not work at 40 hours per week.

There is yet another problem. While the instrumental variable approach can adequately deal with the problem of endogeneity of wage and virtual income, this approach does not address the issue of kink locations. This can be a problem unless it is assumed that individuals do not locate themselves at kinks or there is no evidence of such clustering in the data set.

Flood and MaCurdy (1992) use both the piecewise-linear budget constraint approach and the instrumental-variable approach to measure work disincentives effects in Sweden using cross-section data. They conclude that the instrumental-variable procedure offer a robust method for estimating the coefficients of the labour supply function. In the absence of measurement error, the error term enters linearly into the specification. The variables that are orthogonal to the structural disturbance can serve as valid instruments for estimating the parameters of the substitution and income effects.

Blomquist (1996) conducted a study to investigate the small sample properties of the methods used in estimating the labour supply parameters with taxes. Using the instrumental variable approach and the Hausman method on Swedish data, he obtained wage elasticities ranging from –0.19 to 0.26, which reiterates the fact that different estimation methods applied to the same data can yield very different results. For the instrumental variable estimator, he uses two different sets of instruments. The first set consists of gross wage rate, taxable non-labour income, non-taxable non-labour income, the squares of these variables, a dummy variable each for age and number of children, which he denotes as IV1. Some analysts such as Flood and MaCurdy (1992) claim that gross wage rate and before tax non-labour income are invalid as instruments because they are not exogenous. They assert that a better set of instrument variables are socio-demographic variables since this will take care of both the endogeneity in the gross wage rate and non-labour income and the endogeneity in net wage rates imposed by non-linear taxes. Taking into account Flood and MaCurdy's argument, Blomquist uses socio-demographic variables for the instrumental variable estimator in his simulation which he denotes as IV2.

In his base simulation, Blomquist keeps the sample size to around 600 and assumes no measurement error. He finds that the quasi-maximum likelihood estimator (QML) of the Hausman method has no small-sample bias and IV1 performed as well as the QML estimator. IV2, which uses socio-demographic variables as instruments, has a negative bias close to –200 percent for the wage rate coefficient in the case of small sample. But when the sample size was increased to 18,000, the bias from IV2 was less than –10 percent. Blomquist argues that the small-sample bias of IV2 is because the instruments are only weakly correlated with the net wage rate. Using the Monte Carlo simulation which incorporated measurement errors, he finds that the bias for the wage coefficient using the QML method tends towards zero, while IV1 shows a negative bias of around −100 percent. However, an additive measurement error in the non-labour income causes the QML to break down, while IV1 estimator performs fairly well. The conclusion from the Monte Carlo simulation is that no estimator is uniquely best and the choice of the estimator should depend on the sample size and type of measurement error in the data.

5. RESULTS OF EMPIRICAL LABOUR SUPPLY STUDIES WITH TAXES

Past studies are divided on the importance of taxes in affecting labour supply. The studies from personal interviews (e.g. Break, 1957; Barlow, Brazer, and Morgan, 1966) found that income tax does not affect the supply of labour. By contrast, econometric studies (e.g. Hall, 1973 and Kosters, 1967) assume that individuals react to taxes with perfect rationality.

Rosen (1976) argues that the scepticism on the importance of taxes as a determinant of work effort is associated with two issues: (a) inaccuracy of an individual's perception towards his or her marginal tax rate, and (b) wage does not matter in the work decision. Using cross-section data on white married women, Rosen found that the two assertions are incorrect because these women do not suffer from tax illusion and married women's labour supply is highly responsive to net marginal earnings. In studying the participation and hours worked among married women in the United States, Leuthold (1978) similarly concludes that increases in the marginal tax rates will reduce both the participation and hours worked among married women, particularly the blacks. Since a tax increase is equivalent to a wage decrease, these findings are consistent with the other studies on the labour supply of married women that their labour supply decrease when wages fall.

Some other studies which derived elasticity estimates of the labour supply response of wives to taxation are Hausman (1981a, 1981b) and Hausman and Ruud (1984) for the United States, Ashworth and Ulph (1981) for the United Kingdom, and Nakamura and Nakamura (1981) for Canada. The estimates obtained from these studies vary widely, partly as a result of different estimation techniques. For instance, Rosen

(1976) showed the highest elasticity estimate of 2.3, while Nakamura and Nakamura (1981) found significant negative uncompensated wage elasticities of –0.30 or less. Hausman (1981a) found that the overall effect of tax on wives wages compared to the no-tax case in the United States is a reduction in labour supply by 18 percent. Hausman (1981b) simulated tax changes on wives labour supply and estimated that a 10 percent tax cut would increase wives labour supply by 4.1 percent. The dead-weight loss decreases significantly with a tax cut. The comparatively high estimates from Hausman's study is a subject of some discussion. In his comments to Hausman's paper, Heckman (1983) raises doubt about the large size of these estimates, which are sensitive to the choice of the functional form of the model and the distributions of unobservables.

Most labour supply studies on prime-age males which ignore taxes estimate a backward bending supply curve. This implies that a reduction in tax rates will increase wages and lead to a reduction in hours of work. A different argument has been forwarded by the supply-side economists that a reduction in tax rates will stimulate a large labour supply increase to such an extent that government revenue would increase.[12] Hausman (1981a, 1981b) found that compared to a no-tax situation, the United States tax system lower desired labour supply by 8.2 percent among males. According to his estimates, Hausman asserts that the increase in labour supply arising from a 30 percent tax cut is roughly three times as large as a 10 percent cut.

A similar study was performed by Ashworth and Ulph (1981) for the United Kingdom which considers a tax change of plus or minus 7 percent and 15 percent of the standard rate of tax for prime-age males. The quantitative results of this study resembles those of Hausman. The predicted response of labour supply to tax changes is greatest among individuals in the highest income brackets. There is some evidence that the income effect dominates in the lowest quintile. The labour supply in this income category is expected to decrease when taxes are lowered. As in Hausman's study, Ashworth-Ulp found that the rise in labour supply is not sufficient to make a tax cut self-financing, since it will only offset about 10 percent of the reduction in revenue from the tax cut.

[12] The tax rate has to be very high for this argument to hold. Bruce Bender (1989) estimates that the tax rate that maximises real tax revenue is in the range of 72 to 82 per cent. This finding corresponds with the tax rates of approximately 70 percent calculated by Stuart (1981) for Sweden and 79 per cent by Fullerton (1982) for the U.S.

Blomquist (1983) uses Hausman's approach in estimating the effect of taxes on labour supply in Sweden. His estimates indicate that taxes have a substantial effect on labour supply. The changes in labour supply corresponding to different wage levels are almost twice as large as the estimates for the United States, in line with the considerably higher tax rates in Sweden.

Despite the sophistication of econometrics in second generation research, the empirical findings on taxes on labour supply are not, in any way, more 'definitive' than the first generation work. The general conclusion is that male labour supply is less sensitive to wage rates and property income than female labour supply, although this is disputed by Nakamura and Nakamura (1981), Mroz (1987), and MaCurdy, Green, and Paarsch (1990). There are outliers and anomalies in the elasticity estimates, but the general range of gross wage elasticity for males is between −0.20 and 0.14, while that for females can go above 0.60. As with the case of first generation studies, the variation of elasticity estimates for hours worked produced by second generation studies is as wide, if not wider, than first generation research.[13] Part of the reason for the variation is that the estimates are not always for the same category of people within and across studies. For instance, even for the same data set, women in different age groups exhibit different structural response to changes in wage and income. In addition, the variation in estimates is also due to the use of different variables and methodologies. Killingsworth (1983) notes that the second-generation elasticity estimates are higher for estimation methods that assume continuous supply than those that allow for a discontinuous labour supply schedule. The procedures used in the first generation work generally produce lower elasticity estimates than the second generation methodologies.

Mroz (1987) examines how the estimated labour supply parameters change when after-tax marginal wage rate is used in the place of wage and virtual income replaces non-labour income. The standard deductions from the tax tables are used to compute the taxes paid and the marginal tax rates. The assumption for virtual income is that the husband's hours of work does not change in response to the wife's hours of work. The estimates of the single worker model are performed with and without adjustment for taxes. Controlling for taxes appears to affect only the estimated wage coefficient. Since

[13] For instance, see Table 4.3 in Killingsworth (1983).

the estimated wage coefficients with controls for taxes lie within one-fifth of one standard deviation of the estimates without taxes, Mroz concludes that the influence of taxes on the estimates of labour supply parameters is at most a second order effect. As an extension to the effect of taxes on labour supply, Mroz tries to test Rosen's (1976) finding that taxes have a significant impact on married women's labour supply. The result of this test is inconclusive implying that we can neither accept or reject the hypothesis that women take taxes into account in their labour supply decision. The fact that Mroz uses a semilogarithmic form while Rosen uses a linear form could be a reason explaining the discrepancy. The semilogarithmic form implies that the uncompensated wage effect diminishes as wages increase, while the linear specification implies a constant uncompensated effect.

6. EMPIRICAL STUDIES IN DEVELOPING COUNTRIES

There is little empirical research in developing countries on the elasticity of labour supply with regard to wages, and even less with income taxation.[14] Available data in developing countries are generally deficient, with much of the empirical work using aggregate macroeconomic data. These studies have limited value in providing some direction to policy makers with regards to tax reform. There is very little in the empirical literature even for the aggregate labour supply elasticity.

In studying urban workers in Africa, Berg (1961) finds that their aggregate supply curve is positively sloped instead of backward-sloping as was the view at that time. Regarding the two seemingly conflicting views, Miracle and Fetter (1970) and Miracle (1976) use qualitative historical data drawn from the copper belt of Africa and from Kenya, respectively, and argue that the two views are not inconsistent since the considerable risk of dying from disease in the early part of the twentieth century had raised the cost of working in urban areas. The backward-bending labour supply curve in Africa later became positively slope with the improvement in health and economic conditions that reduced the costs associated with urban employment. Among the few studies on the rural labour market, Bardhan (1979) finds evidence of a positively sloping labour supply response to wage among the agricultural workers and small cultivators in

[14] For a brief survey of the empirical literature, see Ebrill (1987a, 1987b).

India. Using data from rural Egypt, Hansen (1969) concludes that there is a strong positive correlation between rural wages and hours worked per day among the rural workers.

Chesher (undated) undertakes an empirical analysis of female labour force participation in Peninsular Malaysia, using the combined household data from the 1980 labour force and income survey data. The income data are net of taxes. Using the probit analysis on participation, he finds that that there is no ethnic difference in the participation of women. The presence of children aged 4 years and below has a negative effect on the participation of women in all age categories, while the presence of children aged 5-9 years has a negative effect on women in the 26-35 years age group as well. For women in the 36-59 years age group, the presence of older children has a positive effect on their participation. Family income has an inverse effect on participation of women in the 20-35 years age group and a quadratic effect on older women. There are positive age effects for younger women and negative age effects for older women. Chesher has also undertaken a similar probit analysis on female employment which has slightly greater explanatory power. He has also tried to capture the interactive effects of ethnicity in some alternative runs. While there appears to be some differences in the coefficients across ethnicity, many of the coefficients are poorly determined because of small sample sizes.

In modelling hours of work, Chesher applies Heckman's (1979) two-step estimation procedure and finds little evidence of selectivity bias arising from the use of observed hours of work data. He then proceeds to estimate hours of work equation by ordinary least squares. While higher levels of education increase the chance of being employed, working women who are more highly educated tend to put in less hours than those who are less highly educated. Women in urban areas are less likely to participate, but when they choose to work, they put in more hours than their rural counterparts. The presence of children has a slight depressing effect on the hours worked by women. In another study on Malaysia, Chesher (1989) finds that the local unemployment rate has a negative effect on the probability of participation, indicating that the discouraged-worker effect outweighs the added-worker effect of unemployment. The negative effect is strongest for women under 25 years.

Studies on labour supply with taxation in developing countries are extremely scarce. In a recent study, Rochjadi and Leuthold (1994) estimate the effect of taxation on labour supply in Indonesia. Using a restricted subsample of 1,353 households from Indonesia's National Social-Economic Survey for 1982, the study estimates the elasticities for male and female head of households between the ages of 21 and 65 years with high school education or above and who were employed in the private sector. In the study, the utility function is assumed to take the constant elasticity of substitution (CES) form

$$U = (aY^{b} + L^{-b})^{-1/b} \tag{12}$$

where a and b are parameters of the utility function, Y is income, and L is hours devoted to leisure. The elasticity of substitution, s, between income and nonmarket activity is a function of b, where s = 1/(1 + b). Since s is greater than zero, b > –1. The estimation model is:

$$\ln (L/Y) = \beta_0 + \beta_1 \text{ Age} + \beta_2 \text{ Sex} + \beta_3 \text{ Education} + \beta_4 \text{ Region}$$

$$+ \beta_5 \text{ Children} + \beta_6 \ln W + u \tag{13}$$

and the ordinary least squares (OLS) is used to estimate equation (15). In their estimations, Rochjadi and Leuthold have only provided the uncompensated wage elasticity and the compensated wage elasticity, but not the non-labour income elasticity since Y is the denominator in the dependent variable. In their estimation for various regions and occupational groups, the uncompensated elasticities for all workers range from –0.02 to –0.06 and the compensated elasticities range from 0.33 to 0.58. Whereas the sign of the uncompensated wage elasticity is ambiguous, using the Slutsky condition they argue that the sign of the compensated wage elasticity is always positive (Rochjadi and Leuthold, 1994: 336). Using an estimation procedure that produces positive compensated wage elasticity for all the estimates would imply that the implicit income elasticity is restricted to be greater than zero. Although Rochjadi and Leuthold use a different estimation procedure, the process of restricting the income effect to be greater than zero is similar to the approach adopted by Hausman. This process will produce elasticity estimates with the 'right' signs. In this regard, Heckman's (1983) critique of the Hausman approach discussed earlier can equally be applied to Rochjadi and Leuthold.

7. CONCLUSION

From the literature review, it is apparent that issues pertaining to the estimation of labour supply parameters are complex. Estimation problems abound and challenge the skill and creativity of analysts for over two decades. After the early estimation efforts in first generation research, analysts soon realised the importance of paying careful attention to model specification. This led a new generation of static labour supply research using advanced techniques. Despite the innovative procedures adopted in second generation research, the wide range of labour supply parameter estimates persist. Sensitivity analyses were conducted on the estimation methods, functional forms and assumptions adopted to determine the source and extent of variation. The results of these studies have been revealing. Economic and statistical assumptions can have a substantial impact on the estimates obtained. However, not all of the disparate results are due to differences in estimation procedure since some studies conduct analysis on subsamples of the same data set and produce different estimates for each category of the subsample.

The incorporation of taxation in the labour supply model presents additional problems to the analyst. Under progressive taxation, the budget set is no longer linear but convex and piecewise linear. The concept of virtual income is used as a device to linearise the budget set so as to simplify the estimation procedure. An advance to the estimation methodology was made by Burtless and Hausman (1978) which allowed the econometric model to have two error terms instead of one, i.e. unobserved heterogeneity of preferences and optimisation error. The maximum likelihood technique is used to solve the equations. In the case of the non-convex budget set, Burtless and Hausman demonstrated the technique of using the Roy's identity to generate the labour supply function from the indirect utility function. This method is valid as long as the Slutsky condition holds. Hausman later elaborated on this technique in a number of papers (Hausman, 1979, 1980, 1985). While the Hausman approach has been adopted by analysts in analysing the non-convex budget set as a result of taxes and welfare programme, Heckman (1983) raises the question whether the Hausman procedure is trying to 'fine tune' too much in the face of data that neither he nor economists are likely to have. This is echoed by Mroz (1987: 786) that the Hausman procedure requires 'exceptionally strong assumptions on the tax structure and the stochastic disturbances in the model'. Heckman (1983: 74) argues that 'previous empirical procedures such as those of Boskin and Hall that incorporate less (false) information into the estimation procedure may be more robust than procedures such as Hausman's which assume information that does not exist and which produce inconsistent estimators if the information is false.' These arguments provide a case for using the instrumental variable approach, which has recently been applied on Swedish data.

In the next chapter, we draw from the methodological experience of second generation work to assess the importance of taxes in the Malaysian labour supply function. We use the instrumental variable approach in the next chapter for this purpose. It is not clear at this stage whether results obtained will correspond to general findings of studies from developed countries. While there is no *a priori* reason why this should not be the case, the differences in the work environment, work culture, and institutional underpinnings with regards to employment, wages, social security and benefit, and household income between the developed and developing countries could influence the final outcome.

Chapter 7

MODELLING LABOUR SUPPLY WITH TAXATION

1. INTRODUCTION

After reviewing the relevant literature on static labour supply modelling in the last chapter, we now proceed to discuss the model specification and the estimation results. This chapter seeks to estimate the labour supply response of married couples in the prime age groups facing the 1984 and 1992 Malaysian income tax rates. Since 1986 the marginal rates of the individual income tax have been reduced in stages. The top rate of 55% was reduced to 40% in 1986 and subsequently brought down to 32% in 1995.

The average family income has expanded rapidly relative to tax exemptions and deductions. As discussed in Chapter 4, the tax base expanded during this period, with more people now falling within the taxable category as the result of bracket creep. The reduction of the top marginal tax rate and the growth in average family income resulted in individuals reaching the top tax bracket faster than they did a decade before. On the other hand, the marginal tax rate at each taxable income category has fallen. This implies that households with family income at the national average, or some multiples of it, are now paying lower taxes. In the light of these developments, it will be interesting and useful to examine the labour supply response under the tax regimes of 1984 and 1992. In this chapter, we examine the effect of income tax on the response of individuals towards participation and hours worked. The purpose of this chapter is to examine the effect of income tax on work incentives in Malaysia. It will generate elasticities of labour supply with and without taxation, and the basis of which will provide some indication whether the treatment of labour supply as an exogenous variable in the tax reform simulations performed in Chapter 5 is reasonable.

This task of estimating the coefficients of the labour supply function with taxation for Malaysia is very much facilitated by the availability of income and labour force data collected by the Department of Statistics. This estimation will certainly increase our understanding of the labour supply characteristics of countries having economic, social and institutional structures which differ from the developed countries. While Malaysia may not represent an average developing country in terms of its income level, growth rate, and rates of unemployment and inflation, it nevertheless shares a similar pattern of development with many high middle income countries, especially those in the Far East.

Much of our understanding of labour supply with taxation are derived from studies conducted in the developed countries which have different tax and transfer payment structures from the developing countries. For instance, in the developed countries, taxes on income, profit and capital gains account for 40 per cent of central government revenue in 1985, while social security contributions account for 30 per cent. The comparable figures for middle income developing countries are 24 per cent and 10 per cent, respectively (World Bank, 1987: Table 24). In Malaysia, total income tax in 1985 contributes about 42 per cent of the federal government revenue and 11.4 per cent of GDP, while individual income tax constitutes about 20 per cent of the total income tax collected.

Many of the elaborate welfare and social benefit systems in operation in the developed countries do not have their equivalent in the developing countries. Without unemployment benefit and income support programmes, an individual who is out of work in a developing country will have to fall back on past savings or rely on the goodwill of relatives. This means that there is a stronger motivation for a person who has just lost his job to get back to work or perform some part-time work. There is no financial advantage for him to choose to remain unemployed or to limit his hours of work as might be the case if he faces a non-convex budget constraint arising from welfare transfer payments within a progressive tax system. The hours of work put in by members of a household may also be affected by welfare programmes, or the lack of them. Without the benefit of income support programmes, poor households in developing countries would have to increase the hours of work to make ends meet. One can argue that under such circumstances some caution should be exercised when trying to make some inferences about the labour supply responses of developing countries on the basis of studies conducted in developed countries.

Much of the discussion of the backward bending supply curves relates to high levels of income (Deaton and Muellbauer, 1980; Sapsford and Tzannatos, 1993). An important assumption in the labour supply model of developed countries is that work is a Giffen good while leisure is a normal good. At higher levels of income, an individual will demand more leisure and correspondingly, less work. Hence, at higher income levels, the individual's supply curve of hours becomes backward-sloping as the wage rate increases because the income effect (which is linked with the demand for more leisure as income increases) is expected to outweigh the substitution effect (which encourages the individual to substitute leisure for work as it becomes relatively more expensive).

There is some evidence of backward-bending labour supply curves in developing countries. These curves occur not at the high income level, but rather among subsistence farmers in rural communities where income is among the lowest. In his study of the supply and demand for labour in Rural West Bengal, Bardhan (1984) found that the supply curve of the hired out farm labourers were backward-bending. Huang (1976) examines the peasant economy of three paddy areas in Malaysia and argues that subsistence farmers are not responsive to economic opportunities and behave according to the notion of a backward-bending supply curve. In examining the effect of taxes on labour supply in Malaysia, we would also be generating results that could shed some light whether there is evidence of a backward-bending labour supply curve for the whole economy, and not just among subsistence farmers, and if so, at what income level is it most evident.

The remainder of this chapter is organised as follows: Section 2 discusses the sources of data and concepts on labour force and household income used in the analyses. This is followed by a discussion on the labour force and income characteristics in Section 3. The model specifications on estimating the labour supply coefficients before and after taxes are elaborated in Sections 4 and 5. Results from the estimations using different alternative assumptions are presented in Section 6, followed by regression results on subgroups in Section 7. Finally, Section 8 discusses the main implications of the findings before the conclusion in Section 9.

2. DATA ON LABOUR FORCE AND HOUSEHOLD INCOME

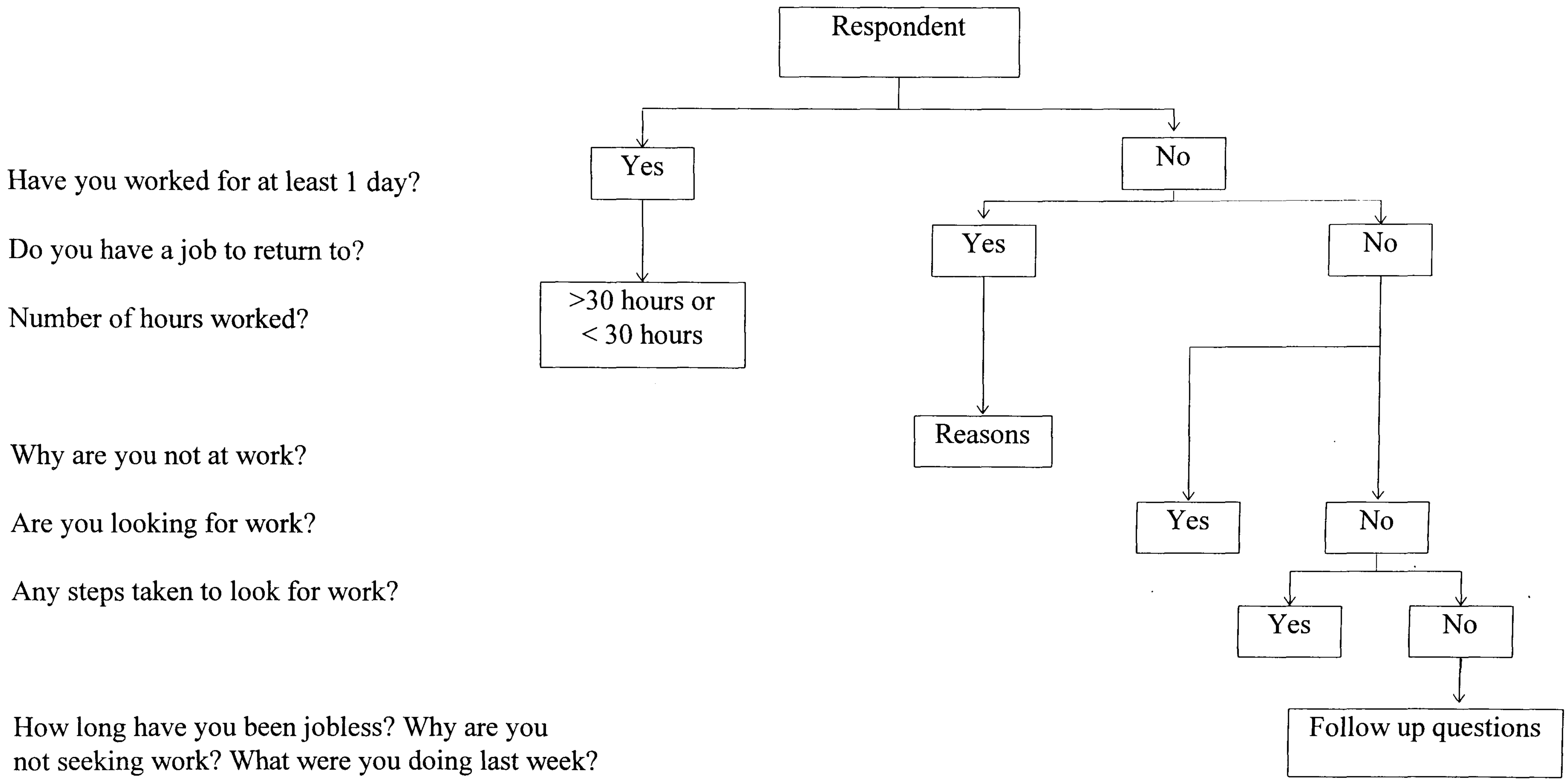
The data used for the analysis in this chapter are drawn from the Malaysian Labour Force Surveys and Household Income Surveys which are collected by the Department of Statistics. It may be useful to provide some details on the two sources of data.

2.1 Labour Force Survey (LFS)

The Labour Force Survey (LFS) collects information on the structure and distribution of labour force, employment and unemployment. The survey covers around 60,000 living quarters and is conducted several times a year to even out the effects of seasonal variations on labour. It employs a stratified multistage sample design in order to obtain reliable estimates at the national and regional level, as well as rural and urban areas. Two categories of information are collected in the survey: (a) the demographic particulars of all household members irrespective of age, and (b) labour force particulars for household members within the 15-64 working age group. Persons living in private households are included in the survey population but not those residing in institutions, such as hostels, hotels, hospitals, prisons, boarding houses and military barracks.

To determine the labour force status of individuals, questions are asked in relation to the reference week immediately preceding the date of the interview. The key question is whether the respondent had worked at least 1 day for pay, profit or family gains during the reference week. Based on the individual's response to a series of questions, it will be possible to categorise an individual's labour force status into a few categories: employed, underemployed, actively or passively unemployed, and out of the labour force. The sequence of questions asked in the labour force survey are shown in the Figure 7.1.

FIGURE 7.1 DETERMINING LABOUR FORCE STATUS



Source: Schematic presentation of the Labour Force Survey questionnaire.

2.1.1 Determining labour force status

A person's labour force status is determined on the basis of his or her responses to the questions asked in the LFS. If a person answers 'Yes' to Question 1, the he/she will be asked Question 3 to determine the number of hours worked. If the answer is 'No' to Question 1, then he/she will be asked Question 2 of whether he/she has a job to return to. If the answer is 'Yes' to Question 2, then he/she is asked why he/she was not at work during the reference week. If the answer is 'No' to Question 2, Questions 5-7 are asked to determine the nature of unemployment.

Response of 'Yes' to Question 1

1. If a respondent has worked for at least 1 day in the reference week, he or she is considered 'employed'.
2. If a respondent worked less than 30 hours, he or she is 'underemployed'.

Response of 'No' to Question 1

1. If a respondent is not working but has job to return to, he or she is 'employed'.
2. If a respondent is not working but looking for work, he or she is 'unemployed'.
3. If a respondent is not working and not looking for work, he or she is asked the reasons for not looking for work. If the respondent believes that there is no job available, or because of bad weather, illness, confinement, waiting for answer from an application, and no qualifications, then he or she is regarded to be 'passively unemployed'. If the respondent is schooling, a housewife, disabled, retired, or not interested in working, then he or she is considered to be 'out of the labour force'. Except for those out of the labour force, all others in the 15-64 age groups are considered to be part of the labour force.

2.2 Household Income Survey (HIS)

There are few household income surveys in the past. Income data at the beginning of the seventies can be obtained from the Post Enumeration Survey (PES) of the Population Census 1970. While conducting PES to ascertain the extent of census undercounting, the Department of Statistics included questions on household income in the survey. In the mid-seventies, the Agricultural Census 1976 contains some questions on household income. After the Agricultural Census, there was a long lapse before the Household Income Survey (HIS), specifically designed to collect household income data, was conducted in 1984. Starting from this survey, the Department of Statistics adopts the strategy of conducting HIS at regular intervals. The Household Income Surveys are attached to the Labour Force Surveys so that the two surveys can be conducted simultaneously for the same sample of households. The HIS for 1984, 1987, 1989, and 1992 were conducted using this strategy. After gathering information on household and labour force characteristics using the Labour Force Survey questionnaire, the interviewers then proceed to obtain income data from the same individuals. Since the households and individuals for the two surveys are similar, it is possible to combine the information from the two surveys to yield a complete record which contains information on household, labour force and income characteristics of an individual.

The HIS collects data on income, taxes as well as transfer receipts and payments for the whole year, using the previous year as the reference year. Where information cannot be obtained directly, interviewers use work sheets to calculate the imputed value of agricultural and non-agricultural activities, home produce consumption, as well as rent for dwelling and agricultural land.

2.3 Concept of Household Income

2.3.1 Earnings

There are two categories of earnings: paid employment income and self employment income (see Table 7.1). Paid employment income includes wages and salaries, allowances, bonuses, commissions and tips, overtime earnings, free food, free/concessional lodging and consumer goods, other payment in kind, and employers contribution to the Employees Provident Fund. If a person is not an employee but is self employed, his or her income is classified as income accrued from self employment.

TABLE 7.1 ANNUAL HOUSEHOLD INCOME DURING THE LAST 12 MONTHS

EARNINGS
1. Earnings during the last twelve months from paid employment
i. Wages and salaries (before income tax, social security contributions, etc.)
ii. Allowances (e.g. cost of living allowances, specialist allowances, housing allowances)
iii. Bonuses
iv. Other cash (like commissions, tips, earnings from overtime work, etc.)
v. Free / concessional food
vi. Free / concessional lodging
vii. Free / concessional consumer goods and services
viii. Other payments received in kind (like paddy, coconut, rubber, etc.)
ix. Employer's contributions to social security
A. Total Paid Employment Income
2. Earnings from self employment during the last twelve months
3. Receipt during the last month from
i. Imputed rent of owner-occupied house
ii. Rent from houses or other property
iii. Rent from lodging
B. Total Other Earned Income
INCOME OTHER THAN EARNINGS
4. Income received during the last twelve months from property
i. Royalties (in respect of copyrights, patents and similar rights)
ii. Rent from agricultural land
iii. Interest (from banks, deposits, bills, bonds, loans, etc.)
iv. Dividends (such as from ownership of shares)
C. Total Property Income
5. Income received during the last twelve months from transfers
i. Remittances (from other households from within and outside the country)
ii. Alimony
iii. Scholarships / Bursaries / Fellowships
iv. Pensions
v. Other periodic payments received (e.g. from an inheritance or trust fund, etc.)
vi. Gifts in cash and in kind
D. Total Current Transfers Received
TOTAL INCOME [A + B + C + D]

Source: Summarised from the Household Income Survey questionnaire

2.3.2 Income other than earnings

This category of income consists of property income and transfer income. Royalties, rent from agricultural land, interest, and dividends are considered property income, while transfer income, scholarships, pensions, and gifts received are classified as current transfer income. The summation of earnings and income other than earnings constitutes the total income of an individual in a household.

2.4 Sample Used for Analysis

The analysis uses a 25 per cent sample of households from the combined data of the Labour Force Survey and the Household Income Survey for 1984 and 1992. The subsample is randomly selected from the survey tape on the basis of households so that the individual records for the selected households appear together. There are about 60,000 individual records on both adults and children for each of the two years. Care is taken to ensure that the households included in the subsample are identical for both LFS and HIS. After verifying that the household indentifiers of the two data sources match exactly, the two data sources are merged. The analysis on households is only confined to the year of the survey. No attempt has been made to combine the data across several years for a longitudinal analysis since a different sample of households is selected for each of the years.

The focus of the study is to examine the participation and labour supply of males and females within the household context. The data base consists of the head of household and his or her spouse who are in the prime age group of 20-54 years. The joint income and joint taxes of the couple are calculated and attached to the couple's record together with the number and ages of their children. Included in the sample are employees, own account workers, housewives, and those of other employment status, but not employers and students. The inclusion of employers would complicate the relationship between earnings and hours of work since only part of their earnings can be attributed to their own labour input. Students are excluded because they are technically out of the labour force. Housewives are included in the sample because most married women who are not working would be classified into this category. Since we wish to consider the participation decision of married women, it is necessary to include housewives in the data.

2.5 Concepts Used in the Model

Participation: This variable refers to those who supply positive hours of work during the reference week and non-participation to those who work zero hours. Those who are out of the labour force are not considered in the participation formulation.[1] Prior to the late 1960s analysts failed to distinguish between participation (employment) and hours of work. This distinction is important because labour supply coefficient estimates based on participation show greater responsiveness to wage and income variation than hours-of-work equation. Heckman (1993) notes that labour supply empirical studies in 1960s showed that the wage and income elasticities are higher for females than for male largely because analysts were using elasticity estimates from the participation equation for females and elasticity estimates from the hours-of-work equation for men. Mroz (1987) dismissed the conventional wisdom that the wage and income elasticities for women are larger than men when he controlled for self-selection bias in the participation equation. This finding concurs with Nakamura and Nakamura (1981) and is supported by Thomas MaCurdy, Green and Paarsch (1990).[2]

Hours: This variable refers to hours of work per week. Hours are positive for those who are working, and zero for those not working. The measurement of hours is a potential source of error because there is inadequate data for paid holidays, absenteeism, time not working due to illness, overtime etc. In addition, the number of hours worked during the reference week need not be the typical hours worked throughout the year. Should an individual work overtime during the reference week, there will be errors in calculating the number of hours worked and, correspondingly, the average wage, which uses hours worked as the denominator. Another source of error is that the observed hours

[1] There is a difference in the usage of the term 'participation' in the labour supply literature and the Labour Force Survey. In labour supply analysis, participation refers to positive hours of work and non-participation to zero hours of work. In the Labour Force Survey, labour force participation refers to those in the 15-64 age group who are not 'out of the labour force'.

[2] More discussion on this issue is found in Chapter 6.

do not correspond to the desired hours because of constraints on the supply side (e.g. health) or the demand side (such as minimum or maximum hours and institutional working hours). In the sample, we have removed those who are employed but reported zero hours of work in the reference week, as a result of being on a holiday, illness, strike, etc. Their inclusion would complicate the calculations since they would appear to be earning wages for supplying zero hours of work.

Wage: The Labour Force Survey does not collect wage data. To derive this variable, annual labour earnings is divided by the hours of work per year, i.e. hours worked during the reference week multiplied by 52 to yield the wage rate before tax (w). The net wage rate or marginal wage (WAGETAX) is given by $w(1 - \tau)$ where w is the wage rate and τ is the marginal tax rate. The marginal tax rate is calculated from the income tax paid by the individual as reported in HIS. Based on the amount of taxes paid reported, it is possible to derive an individual's marginal tax rate, that is, his or her tax bracket. The marginal wage is used to find the point of tangency between the utility function and the budget constraint in order to determine the hours of work. Theoretically, it is the marginal wage rather than the average wage that an individual is concerned with in deciding whether to put in an extra hour of work. In many studies, the marginal wage is estimated from official income tax schedules calculated on the basis of reported income. In this case, assumptions need to be made about the amount of allowable deductions and the extent of separate or joint assessment of the income of married couples. The calculated tax is unlikely to correspond with the actual amount of tax paid by the individual since it overlooks tax avoidance and evasion. Since hours of work is used to derive WAGETAX, errors in measuring hours are transmitted to the measurement of wage.

Non-Labour Income Variable: This variable is equal to an individual's total income minus his/her labour income plus the total income of his or her spouse. There is the practical problem of estimating the non-labour portion of an individual's income. In some cases, it may require imputing the value of the rental of owner-occupied dwellings and goods produced for own consumption. The model considers only income from the spouse and not the other people in the household. Some older couples may have married children or other relatives living in the same household but it is difficult to say to what extent their income affect the labour supply of the couple. In most Asian families, the men are the main breadwinner, as indicated by over 95 per cent of married men who were reported as being the head of household.

Education (EDUC): Dummy variables are used for primary, lower secondary, upper secondary, and tertiary education against the reference group of those not having any education. The LFS provides the highest level of educational attainment for each household member.

Experience (EXPRC): This variable refers to potential work experience, which is measured in years and is used only for males. This variable is estimated because LFS does not collect information on work experience. To calculate this variable, we estimate the age of leaving school, i.e. years of schooling plus 6, which is the first age of schooling. If the age of leaving school is greater than 15 years, then the potential work experience variable of an individual is his age minus the age of leaving school. If the age of leaving school is less than 15 years, then the potential work experience variable is assumed to be an individual's age minus 15. The rationale for using 15 years as a cut off point is because there is automatic promotion up to 9 years of schooling, while child labour is a non-issue in Malaysia. It may be argued that children below 15 years may help out in the farm or family business and that would contribute to their experience. The model, nevertheless, assumes that an individual would begin to accumulate work experience that would make a difference to his wage only after 15 years of age. The work experience variable can be used for the males without much problem because of their high participation rate and very low unemployment rate, which means that there is no breaks in estimating an individual's work experience. This variable is not used for females since there may be career breaks in a woman's life-cycle and on which we have no information.

Children: Dummy variables are used for children in different age groups, i.e. 1 year and less (CH1), 2 years (CH2), three to five years (CH3_5), six to eleven years (CH6_11), and twelve to sixteen years (CH12_16). In LFS, age is reported in years. The age group 6-11 years corresponds with 6 years of primary education, while the age group 12-16 years corresponds with 5 years of secondary education. Children undergoing tertiary education and high school are above 16 years old where many would have to leave home to attend college or university.

Urban (URB) is a dummy for all gazetted areas with population of 10,000 and above. This variable refers to the place of dwelling and is not necessarily the work place of a respondent.

Occupation: The classification of occupation follows the Malaysian Dictionary of Occupational Classification which adopts the recommendations of the International Labor Organization. The acronyms for the occupations used in the model are as follows:

TEACH = teachers who are classified under the professional and technical occupation. Teachers generally report lower hours of work, averaging 25-30 hours per week. In collecting this information, it is clear that LFS takes into account the time spent during normal schooling hours but not the time spent by teachers on extra-mural activities, preparation of teaching materials, and marking of school work outside schooling hours.

PROF = professional and technical workers, excluding teachers; ADM = administrative and managerial workers; CLR = clerical workers; SALE = sales workers; SER = service workers; AGRIWKR = agricultural workers, who are not necessarily farmers since this occupational group include estate managers, planters, and fishermen as well; and PROD = production workers.

3. LABOUR FORCE AND INCOME CHARACTERISTICS

Malaysia's labour force was growing at an annual growth rate of 2.7 per cent and is estimated to be 8.1 million in 1995. During the last 10 years, the size of the labour force was growing at 2.9 per cent per annum, while the labour force participation rate for those in the 15-64 age group was 67 per cent. Although the unemployment rate peaked at 8.8 per cent in 1986 during the height of the recession, it has fallen steadily to around 3.0 per cent for the last three years when the country reached full employment of its workforce.

According to Lucas and Verry (1990), married women plays an important role in bringing about labour force adjustments as economic conditions change, both cyclically and in the long term. Despite the recent increases in labour force participation of females, their participation rates for all age groups are below 50 per cent and married women tend to respond readily to economic incentives, such as changes in wages, labour market conditions, educational opportunities, etc.

The effects of education on labour force participation in Malaysia do not form a clear pattern. Except for those with primary education, individuals of either sex are more likely to participate in the workforce as their educational levels increase. This pattern is more marked for females than for males. Those with primary education have higher participation rates than those with lower secondary education (Lucas and Verry, 1990: 5). Participation seems to be higher in rural than in urban areas, although the nature of participation in the two strata may not share similar characteristics. For instance, women in rural areas may perform agricultural activities alongside their other household activities.

Household income grew rapidly during the last two decades. This was accompanied by the reduction of the poverty incidence of 49.3 per cent in 1970 to 16.7 per cent in 1990 (Malaysia, 1991a: 43). Households benefited from productivity increases and structural changes in rural employment that widen the scope of economic activities and raised income. The expansion in non-agricultural jobs encouraged large numbers of self-employed and unpaid family workers to enter the waged labour market and made wage income an important component of income in rural areas.

Table 7.2 shows the mean and standard deviation of the variables for males and females in the sample based on the combined Labour Force Survey and Household Income Survey (LFS/HIS) data set for 1984 and 1992. The sample consists of married heads of household and his/her spouse in the prime age groups. The average age in the sample is 38 years for males and 36 years for females, both of whom have around 6-7 years of education. Waged employment is the most important source of income for the average individual, while the income accrued from self-employment is much smaller.

The contribution of property income and net transfer income to the total income of an average male is small, although the contribution of net transfer income to female income is slightly larger than the males. Average income has increased between 1984-1992 and average hours worked have risen by 2 hours for males and 1 hour for females.

In terms of hours worked, four-fifths of the males in urban areas and three-quarters in the rural areas work between 31-60 hours per week (see Table 7.3). Among females, two-thirds of the workers in the urban areas and three-fifths of workers in the rural areas work between 31-60 hours per week. The degree of under employment, i.e. people working below 30 hours per week, is larger in rural areas than urban areas and for females than males. This corresponds with the nature of agricultural activities in rural areas, which are influenced by weather and outdoor working conditions, seasonality and minimal manpower input required during the growth phase of some field crops. Women who work shorter hours per week are normally involved in part-time work to augment family income while performing their household activities. The degree of underemployment was generally lower in 1992 than 1984.

The distributions of taxes paid and marginal tax rates are shown in Table 7.4 and Table 7.5, respectively. The majority of people in the labour force in Malaysia do not pay income tax. An important reason for this is the low net wage earned by the average worker (see Table 7.2). About three-quarters of the males are non-taxpayers and among those who pay taxes, the median taxpayer falls within the 12 per cent tax bracket. The proportion of females who are non-taxpayers is even larger than the males, attributable to the lower female participation rate (38 per cent in 1984 and 40 per cent in 1992) as against 97 per cent for the males. Over 90 per cent of females do not pay taxes although the percentage of female non- taxpayers is lower in 1992 than it was six years before. The median female taxpayer has also moved up the tax bracket, from 9 per cent in 1984 to 12 per cent in 1992.

TABLE 7.2 MEAN AND STANDARD DEVIATION OF VARIABLES

Male

	1984		*1992*	
Variable	*Mean*	*Std. Dev*	*Mean*	*Std. Dev*
Age	37.8	8.4	38.7	8.0
Experience	22.3	8.3	23.2	8.0
Education	6.1	3.1	6.5	3.1
Hours	45.6	15.9	47.4	15.7
Net wage	5.45	7.02	6.11	7.29
Tax paid	449	2,392	397	1,823
Employment income	8,771	12,339	10,742	15,580
Self employed income	1,931	8,712	2,044	5,065
Property income	121	1,840	173	1,207
Net transfer income	181	1,233	278	1,609
Total mean income	11,007	16,167	13,237	17,365
Virtual income ('000)	2.921	5.563	4.621	17.350
Non-labour income ('000)	3.288	6.872	4.998	17.757
Total in sample	*6,654*		*8,007*	

Female

	1984		*1992*	
Variable	*Mean*	*Std. Dev*	*Mean*	*Std. Dev*
Age	35.3	8.8	36.4	8.6
Education	6.8	3.9	6.7	3.6
Hours	15.8	22.6	16.9	23.0
Net wage	3.66	4.40	4.94	12.99
Tax paid	34	318	64	390
Employment income	1,463	3,958	2,579	15,158
Self employed. income	222	1,300	307	1,869
Property income	89	123	44	419
Net transfer income	209	1,134	246	1,533
Total mean income	1,903	4,493	3,176	15,503
Virtual income ('000)	11.580	15.530	14.700	49.740
Non-labour income ('000)	12.100	17.330	15.199	50.313
Number in sample	*8,138*		*9,526*	

Source: Sample from LFS/HIS

TABLE 7.3 HOURS WORKED BY STRATUM
(In Percentage)

Male

Hours	*1984*		*1992*	
	Urban	*Rural*	*Urban*	*Rural*
1– 10 hours	0.7	0.7	0.1	0.6
11 – 30 hours	6.7	14.0	3.8	13.9
31 – 35 hours	4.5	7.0	3.5	8.0
36 – 40 hours	14.0	16.4	9.2	10.8
41 – 45 hours	17.6	13.4	15.0	12.0
46 – 50 hours	28.5	25.6	36.9	27.2
51 – 60 hours	16.6	12.1	18.1	16.8
61 – 80 hours	8.5	8.4	10.1	8.4
81 – 100 hours	2.2	2.0	2.8	1.9
Above 100 hours	0.7	0.4	0.5	0.4
Median category	*46-50 hours*	*41-45 hours*	*46-50 hours*	*41-45 hours*

Female

Hours	*1984*		*1992*	
	Urban	*Rural*	*Urban*	*Rural*
1– 10 hours	2.3	3.6	1.5	3.0
11 – 30 hours	20.4	28.4	16.7	26.3
31 – 35 hours	6.1	9.6	6.1	10.2
36 – 40 hours	12.2	12.0	10.3	10.7
41 – 45 hours	16.6	13.4	15.5	10.5
46 – 50 hours	22.6	17.5	30.0	21.4
51 – 60 hours	9.6	7.9	11.0	9.9
61 – 80 hours	7.5	5.2	6.4	6.3
81 – 100 hours	2.1	2.1	2.2	1.5
Above 100 hours	0.6	0.4	0.3	0.2
Median category	*41-45 hours*	*36-40 hours*	*41-45 hours*	*36-40 hours*

Source: Sample from LFS/HIS

TABLE 7.4 DISTRIBUTION OF TAXES PAID

Male

Tax (RM)	1984			1992		
	Frequency	%	% of Taxpayers	Frequency	%	% of Taxpayers
No Tax	*5,081*	*76.4*	–	*5,877*	*73.3*	–
150 and less	329	4.9	20.9	390	4.9	18.3
151 – 375	339	5.1	21.6	511	6.4	24.0
376 – 1,050	410	6.2	26.1	563	7.0	26.4
1,051 – 2,050	210	3.2	13.4	310	3.9	14.6
2,051 – 5,000	146	2.2	9.3	241	3.0	11.3
50,001 – 10,000	77	1.2	4.9	69	0.9	3.2
10,001 – 15,000	23	0.3	1.5	21	0.3	1.0
15,001 – 30,000	34	0.5	2.2	22	0.3	1.0
Above 30,000	5	0.1	0.3	3	0.0	0.1
Total	6,654	100.0	100.0	8,007	100.0	100.0
Median category	*RM375-1,050*			*RM375-1,050*		

Female

Tax (RM)	1984			1992		
	Frequency	%	% of Taxpayers	Frequency	%	% of Taxpayers
No Tax	*7,745*	*95.2*	–	*8,719*	*91.5*	–
150 and less	118	1.4	30.1	159	1.7	19.7
151 – 375	91	1.1	23.2	233	2.4	28.9
376 – 1,050	126	1.5	32.1	247	2.6	30.6
1,051 – 2,050	34	0.4	8.4	111	1.2	13.8
2,051 – 5,000	18	0.2	4.6	46	0.5	5.7
50,001 – 10,000	4	0.0	1.0	10	0.1	1.2
10,001 – 15,000	2	0.0	0.5	1	0.0	0.1
Total	8,138	100.0	100.0	9,526	100.0	100.0
Median category	*RM151-375*			*RM376-1,050*		

Source: Sample from LFS/HIS

TABLE 7.5 DISTRIBUTION OF MARGINAL TAX RATES

Male

Marginal Tax Rate (%)	*1984*		*1992*	
	Frequency	*%*	*Frequency*	*%*
6	329	20.9	390	18.3
9	339	21.5	511	24.1
12	236	15.0	315	14.8
15	174	11.1	248	11.6
20	210	13.4	310	14.6
25	93	5.9	141	6.6
30	41	2.6	77	3.6
35	64	4.1	74	3.5
40	43	2.7	35	1.6
45	30	1.9	24	1.1
50	9	0.6	3	0.1
55	5	0.3	2	0.1
Median category	*12 %*		*12 %*	

Female

Marginal Tax Rate (%)	*1984*		*1992*	
	Frequency	*%*	*Frequency*	*%*
6	118	30.1	159	19.7
9	91	23.2	233	28.9
12	70	17.9	147	18.2
15	56	14.3	100	12.4
20	33	8.4	111	13.8
25	14	3.6	35	4.3
30	4	1.0	10	1.2
35	2	0.5	8	1.0
40	4	1.0	4	0.5
Median category	*9 %*		*12 %*	

Source: Sample from LFS/HIS

4. MODEL SPECIFICATION

The model used to estimate the labour supply equation parameters follows the theoretical and economic strategies employed in second-generation research for static labour supply models.[3] A key aspect of second generation model specification is the incorporation of unobservables which affect the labour supply decision. To keep the model specification simple, we shall begin by specifying the basic model of labour supply before taxation. Let the individual's utility function be given by

$$U = C^{\alpha} L^{\beta} \tag{1}$$

subject to

$$PC = W(1 - L) + Y \tag{2}$$

$$L = (1 - H) \tag{3}$$

where C is a composite consumer good, L is leisure time, P is price, W is wage and Y is non-labour income. Total time T is normalised to 1 so that H is the proportion of time spent at market work, while $(1 - H) \equiv L$ is the proportion of time spent in leisure. To simplify, we drop P and redefine W and Y to be real wage and the level of property income. However, this theoretical model overlooks the fact that individuals differ not only in terms of observable variables, such as W and Y, but also in terms of the unobservable error term, e, which plays a role in labour supply decisions.

Substituting

$$C = W(H + e) + Y \tag{4}$$

$$L = 1 - (H + e) \tag{5}$$

into the utility function, we have

$$U = [\ W(H + e) + Y]^{\alpha}\ [\ 1 - (H + e)]^{\beta} \tag{6}$$

[3] There are several ways of presenting the formulations for static labour supply with taxation in second generation work. For the sake of consistency, we use the approach adopted by Killingsworth (1983) as the basis for our model specifications.

where e is an unobservable, non-random error term that varies from one person to another. The term in the first set of square brackets is real goods consumption C, while the term in the second square bracket is leisure. The unobservable error term e represents 'taste differences' or 'heterogeneity in preferences' that account for the different levels of utility that individuals derive from identical combinations of consumption and leisure. It is also associated with reservation wage and participation decision of individuals.

The marginal rate of substitution M is given by

$$M = \frac{\partial U / \partial L}{\partial U / \partial C} \tag{7}$$

It can be shown to equal

$$M = \frac{b}{(1-b)} \frac{C}{L}$$

$$= \frac{b}{(1-b)} \frac{[W(H+e)+Y]}{[1-(H+e)]} \tag{8}$$

where $b \equiv \beta / (\alpha + \beta)$. The reservation wage M^* is where $H = 0$ and $L = 1$ is given by

$$M^* = \frac{b}{(1-b)} \frac{(We+Y)}{(1-e)} \tag{9}$$

An individual with a given value of e will work if and only if his offered wage exceeds his reservation wage, i.e. $W > M^*$. Substituting for the reservation wage and expressing the participation criterion as a condition on the error term yields the following conditions

$$H > 0 \qquad \text{iff} \qquad \varepsilon_H > -J \tag{10}$$

$$H = 0 \qquad \text{iff} \qquad \varepsilon_H \leq -J \tag{11}$$

where $\varepsilon_H \equiv -e$ and $J \equiv [(1 - b) - b(Y/W)]$. If an individual chooses to work, his or her utility is maximised at the point of tangency between the budget line and the indifference curve, which is given by equating W with M. Applying this condition to Equation (8) and solving it for H, the empirical labour supply function for workers is

$$H = (1 - b) - b\,(Y/W) + \varepsilon_H \tag{12}$$

where $\varepsilon_H = -e$ for all positive values of H.

The incorporation of the error term in the utility function has made it possible to derive the threshold condition for participation, as given by Equation (10) and Equation (11). Based on the values of W and Y, the analyst can never be sure if an individual chooses to work or not since his/her decision would also depend on his/her 'inclination towards work', as given by ε_H. The individual will participate if his or her ε_H is sufficiently large and exceeds $-[(1-b) - b(Y/W)]$, or if the value of the right-hand side of the equation becomes smaller than ε_H as a result of an increase in real wage. An individual would choose not to work when $\varepsilon_H \leq -[(1-b) - b(Y/W)]$.

4.1 Participation Equation

Initially, let us assume that we observe the real wage rate W for all individuals in the population, including non-workers. To derive the probability that a given individual i will work, we further assume that ε_H has a mean of zero, has a standard deviation of σ_H, and is normally distributed in the population as a whole. This implies that the standardised normal variable $\varepsilon_{Hi} / \sigma_H$ has a mean of zero and a variance of 1. Given the assumption of the population distribution of ε_{Hi}, the probability that the individual will work is given by

$$\Pr[\text{ i works}] = \Pr[(\varepsilon_{Hi} / \sigma_H) > (-J_i / \sigma_H)]$$

$$= \int_{-J_i/\sigma_H}^{\infty} f(t)dt = 1 - F(-J_i / \sigma_H) \qquad (13)$$

where $J_i = 1 - b - b(Y_i/W_i)$, $\varepsilon_H = -e$ for all positive values of H, f is the standard normal density function, and F is the cumulative normal density function. The cumulative normal density function $F(-J_i / \sigma_H)$ gives the proportion of those who are not working. Given a sample of N individuals of whom k are observed working, the likelihood function for a sample of individuals in terms of employment status (working or not working) is given by

$$L = \prod_{i=1}^{k}\left[1 - F\left(\frac{-J_i}{\sigma_H}\right)\right]\prod_{i=k+1}^{N}\left[F\left(\frac{-J_i}{\sigma_H}\right)\right] \tag{14}$$

Or in full

$$L = \prod_{i=1}^{k}\left\{1 - F\left[-\frac{(1-b)}{\sigma_H} + \left(\frac{b}{\sigma_H}\right)\left(\frac{Y_i}{W_i}\right)\right]\right\} \times \prod_{i=k+1}^{N}\left\{F\left[-\frac{(1-b)}{\sigma_H} + \left(\frac{b}{\sigma_H}\right)\left(\frac{Y_i}{W_i}\right)\right]\right\}$$

Equation (14) is the standard probit likelihood function which is the product of the probability of observing k individuals working and the probability that $(N\text{-}k)$ individuals are non-workers, given their respective values of Y and W. The two parameters of b/σ_H and $(1-b)/\sigma_H$ can be estimated by maximising the likelihood function with respect to b/σ_H and $(1 - b)\ /\sigma_H$.

As discussed in the earlier chapter, there is a problem with using real wage in the labour supply model. Wages are only available for those who work but not for the non-workers. Estimating hours of work using the data based on workers, with the values of non-workers set to zero, would create a misspecification problem. On the other hand, excluding non-workers from the sample to estimate hours of work creates a sample selection bias problem. Even the remedy that had sometimes been adopted, that is, by deriving the impute wages based on the least-squares estimate of the wages for workers and use the imputed wages in place of W, would give rise to potential selectivity bias problem.

Heckman (1974, 1976) addresses this problem by adopting the 'proportionality' hypothesis in which hours of work are taken to be proportional to the difference between the real wage W and the reservation wage M^* whenever $W>M^*$ and zero otherwise. The model is

$$W_i = \gamma\mathbf{X}_i + \varepsilon_{Wi} \tag{15}$$

$$M_i^* = a_M^* + c_M^* Y_i + \mathbf{d}_M^*\mathbf{Z}_i + \varepsilon_{Mi}^* \tag{16}$$

$$H_i = b(W_i - M_i^*) = a + bW_i + cY_i + \mathbf{d}\mathbf{Z}_i - b\varepsilon_{Mi}^* \tag{17}$$

if and only if $W_i > M_i^*$

$$H_i = 0 \text{ if and only if } W_i \leq M_i^* \tag{18}$$

where $a = -ba_M^*$, $c = -bc_M^*$, $\mathbf{d} = -b\mathbf{d}_M^*$, W_i is real wage, M^* is reservation wage, $\boldsymbol{X}_i$ and $\boldsymbol{Z}_i$ are observable variables, Y_i is non-labour income, and H_i is hours of work. The participation equation implied by equations (15)–(18) is

$$\Pr[i \text{ works}] = \Pr[W_i > M_i^*]$$

$$= \Pr[\gamma\mathbf{X}_i + \varepsilon_{Wi} > a_M^* + c_M^* Y_i + \mathbf{d}_M^*\mathbf{Z}_i + \varepsilon_{Mi}^*]$$

$$= \Pr[\varepsilon_{Wi} - \varepsilon_{Mi}^* > -J_i]$$

where $J_i = \gamma\mathbf{X}_i - (a_M^* + c_M^* Y_i + \mathbf{d}_M^*\mathbf{Z}_i)$. Let us define $\varepsilon_{Di} \equiv (\varepsilon_{Wi} - \varepsilon_{Mi}^*)$ as the difference between two normally distributed random variables with variances σ^2_W and σ^2_M and with a covariance σ_{WM}. Accordingly, ε_{Di} is normally distributed with mean zero and variance $\sigma^2_D = \sigma^2_W + \sigma^2_M - 2\sigma_{WM}$.

As before, the parameters of the participation function can be estimated by using probit likelihood function on the set of workers and non-workers. Assuming a set of N individuals of whom k are working, the likelihood function is given as follows

$$L = \prod_{i=1}^{k}[1 - F(-J_i/\sigma_D)]\prod_{i=k+1}^{N}F(-J_i/\sigma_D) \tag{19}$$

where $J_i = \gamma\mathbf{X}_i - a_M^* - c_M^* Y_i - \mathbf{d}_M^*\mathbf{Z}_i$. This approach replaces W for which data are usually available for workers only with variables on the right hand side of Equation (15).

4.2 Wage Equation

The purpose of estimating the participation function is to form a measure of λ so that it could be used to estimate the parameters of the wage equation via selection bias-corrected regression. Using results well known in the literature (see Heckman, 1979: 156) and applying it to the wage equation, we have

$$E[\varepsilon_{Wi} \mid \varepsilon_{Hi} > -J_i] = (\sigma_{WH}/\sigma_H)\,\lambda_i$$

$$\lambda_i = \frac{f(-J_i/\sigma_D)}{1 - F(-J_i/\sigma_D)} \tag{20}$$

where f and F are the probability density function and the cumulative distribution function, respectively, for the standard normal random variable, and λ_i is the inverse of Mills' ratio, which is the ratio of the ordinate of a standard normal to the tail area of the distribution. The estimated $\tilde{\lambda}_i$ computed from the probit parameters from Equation (19) are used with $\mathbf{X}_i$ to estimate a selection bias-corrected regression for the wage equation using data on workers. The wage equation is given by

$$W_i = \gamma \boldsymbol{X}_i + z\tilde{\lambda}_i + \upsilon_i \tag{21}$$

where υ_i is a mean-zero random error term, z is an estimate of the ratio σ_{WD}/σ_D, and σ_{WD} is the covariance between ε_{Wi} and ε_{Di} ($= \varepsilon_{Wi} - \varepsilon_{Mi}{}^*$). The computations used in the 'Heckit' estimation procedure, which is based on the method of moments and consistent estimations, are discussed in Heckman (1979) and Greene (1981).

4.3 Hours of Work Equation

The estimation of the wage equation parameters provides the means of getting around the endogeneity problem of net wages in the hours of work equation to be estimated in the next stage. The expected value of hours worked among people who work is as follows

$$\begin{aligned} E\,[H_i \mid W_i > M_i^*] &= E\,[H_i \mid (\varepsilon_{Di}/\sigma_D) > (-J_i/\sigma_D)] \\ &= a_H + b_H\gamma\mathbf{X}_i + c_H Y_i + d_H Z_i + E\,[\varepsilon_{Hi} + b_H\varepsilon_{Wi} \mid (\varepsilon_{Di}/\sigma_D) > (-J_i/\sigma_D)] \\ &= a_H + b_H\gamma\mathbf{X}_i + c_H Y_i + d_H Z_i + [(\sigma_{HD}/\sigma_D) + b_H(\sigma_{WD}/\sigma_D)]\,\lambda_i \end{aligned}$$

where

σ_{HD} = covariance between ε_{Hi} and ε_{Di} (which is equal to $\varepsilon_{Wi} - \varepsilon_{Mi}{}^*$)

σ_{WD} = covariance between ε_{Wi} and ε_{Di}

$\lambda_i = f(-J_i/\sigma_D)/[1 - F(-J_i/\sigma_D)]$

$J_i = \gamma\mathbf{X}_i - (a_M{}^* + c_M{}^* Y_i + \mathbf{d}_M{}^*\mathbf{Z}_i)$

In this stage of the estimation procedure, the equation for the selection bias-corrected regression on those who work is

$$H_i = a_H + b_H\hat{W}_i + c_H Y_i + \mathbf{d}_i\mathbf{Z}_i + \partial\tilde{\lambda}_i + \upsilon_i \tag{22}$$

The fitted wage is the instrumental variables measure of W and computed from $\hat{W}_i = \hat{\gamma}X_i$, where the $\hat{\gamma}$ are the estimated parameters in Equation (21).

For our estimations in Section 6, we have adopted a simple model to estimate hours of work equation for both males and females where the spouse's effect on an individual's labour supply is mainly through his or her non-labour income. While we realise that this individual-based model may have some limitations (since one could possibly consider the couple's leisure as being complementary or the cross-substitution effect of the spouse's wage rate), this approach has the advantage of being relatively straightforward, its results are easy to interpret, and it does not require restrictions to ensure household equilibrium. In the literature, there are more complex approaches to model family making. However, there is no consensus on best to model family labour supply since models of this nature always involve some degree of trade-offs.

5. TAXES AND LABOUR SUPPLY

The basic labour supply model can be extended to incorporate taxes. From Equation (2), the budget constraint in the absence of taxes and transfers could be written as

$$Y + WH = C \tag{23}$$

With the imposition of taxes, the individual bears a tax liability Λ, which is a function of property income Y and earnings E, the product of hours of work and wage rate. The budget constraint after taxes is

$$Y + WH - \Lambda(Y, WH) = C \tag{24}$$

The tax liability increases with property income and earnings. Hence, the first order conditions are given by

$$\delta\Lambda/\delta Y \equiv \tau_Y > 0$$

$$\delta\Lambda/\delta E \equiv \tau_E > 0$$

where τ_Y is the marginal tax rate on property income and τ_E is the marginal tax rate on earnings. Under normal circumstances, the marginal tax rate is assumed to lie between 0 and 1, i.e. $0 < \tau_{Y,E} < 1$.

In a progressive tax system, the rise in non-labour income and earnings will shift an individual into higher marginal tax brackets. The second order conditions are as follows:

$$\delta^2\Lambda/\delta Y^2 \equiv \tau_{YY} \geq 0$$

$$\delta^2\Lambda/\delta E^2 \equiv \tau_{EE} \geq 0$$

$$\delta^2\Lambda/\delta Y\delta E \equiv \delta^2\Lambda/\delta E\delta Y \equiv \tau_{EY} \geq 0$$

As an individual increases his hours of work, his tax liabilities will increase along with his earnings. The net earnings from an additional hour of work is given by

$$(\delta E/\delta H)-(\delta\Lambda/\delta H) = (\delta E/\delta H)-[(\delta\Lambda/\delta E)(\delta E/\delta H)]$$

$$= W-\tau_E W = \omega \qquad (25)$$

where $\omega \equiv (1-\tau_E)W$ is the after-tax or net real wage rate, which is the slope of the budget constraint and represents the opportunity cost of one hour of leisure.

As mentioned in the earlier chapter, the concept of virtual income is widely used in empirical studies on taxation as a device for linearising the convex budget set. In formulating virtual income, let the net wage ω gives slope of the linearised budget constraint at the individual's labour supply maximum. The individual's adjusted property income y is implicitly defined by the following relationship:

$$y + \omega H = C \qquad (26)$$

$$y = C - \omega H$$

from (24) $\quad Y + WH - \Lambda = C$

$$y = Y + WH - \Lambda - \omega H$$

Since $\omega \equiv (1 - \tau_E)W$

Therefore, virtual income is

$$y = Y - (\Lambda - \tau_E WH) \tag{27}$$

where $\tau_E WH$ is tax paid on earnings, Λ is tax liability, and C is consumption.

6. ESTIMATION RESULTS

We undertake several estimations on hours of work for both males and females. The baseline estimation is first performed in three stages for the whole sample of married couples within the 20-54 years age group. Next, alternative estimations are performed to determine the extent to which the results differ from the baseline estimations. The four categories of alternative estimations are: (a) hours of work without instrumental variables, (b) three stage estimation for those working between 25-60 hours a week, (c) pre-tax hours of work estimation, and (d) regressions by subgroups of occupation, education and employment category.

6.1 Baseline Participation Equation

The baseline model is estimated in three stages in order to derive the hours of work equation for males and females in the prime age group. In the first stage, the parameters for the participation equations[4] for males and females are derived using the probit estimation procedure.

6.1.1 Male

Potential work experience (EXPRC) is a measure of the number of years worked after leaving school or after the age 15, whichever comes later. This variable is estimated in its quadratic form, that is, experience and experience squared. For a graphic presentation of the two coefficients, the male participation equation in Table 7.6 is plotted in terms of its standard normal density function. As shown in Figure 7.2 and Figure 7.3, the likelihood of participation (which varies from 0 to 1) is on the vertical axis and different years of experience is on the horizontal axis. The mean values are used

[4] In the literature, the term 'labour supply equation' can either refer to the probability of participation equation or hours of work equation. To avoid confusion, we refrain from referring to the participation equation as the labour supply equation.

Figure 7.2 Male Participation by Experience, 1984

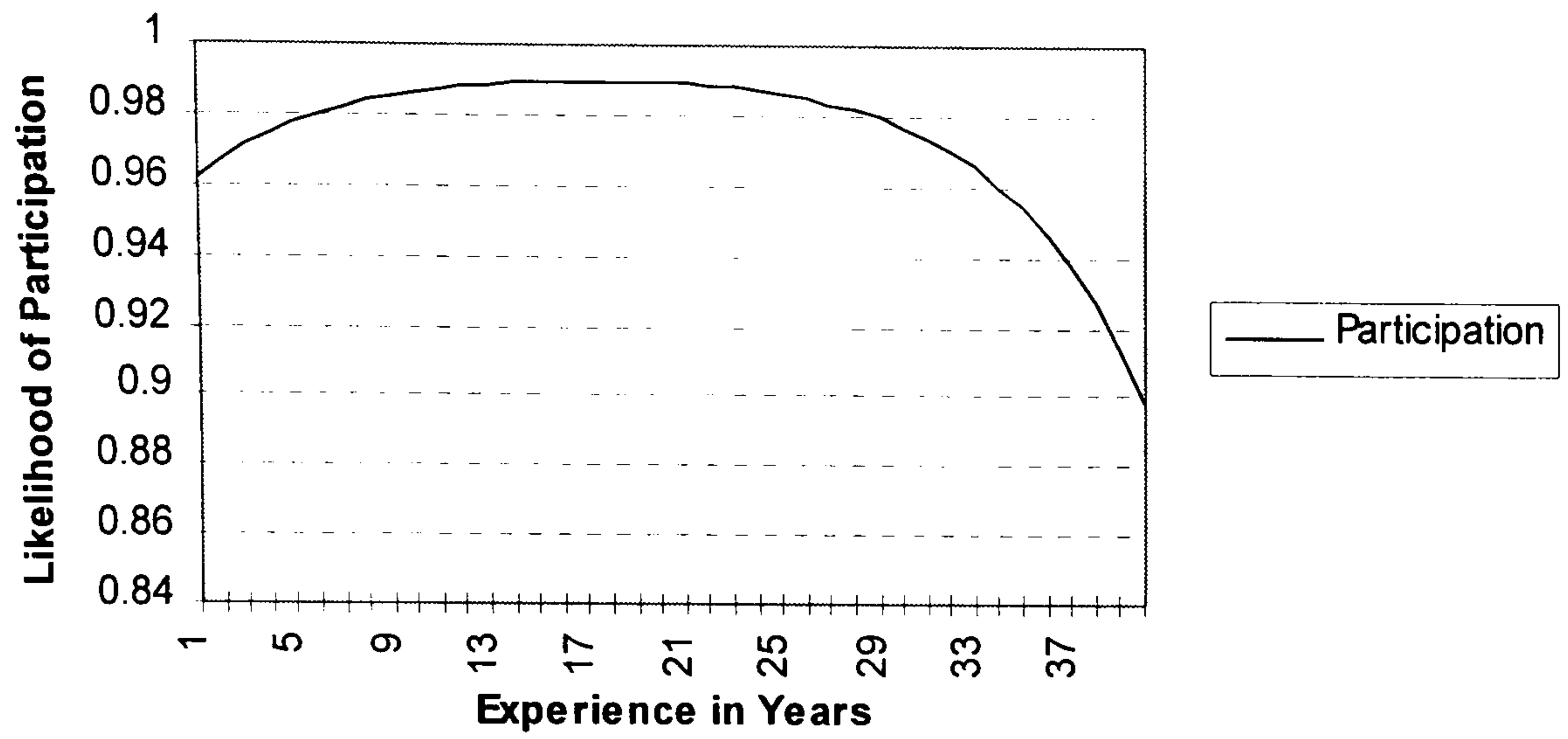


Figure 7.3 Male Participation by Experience, 1992

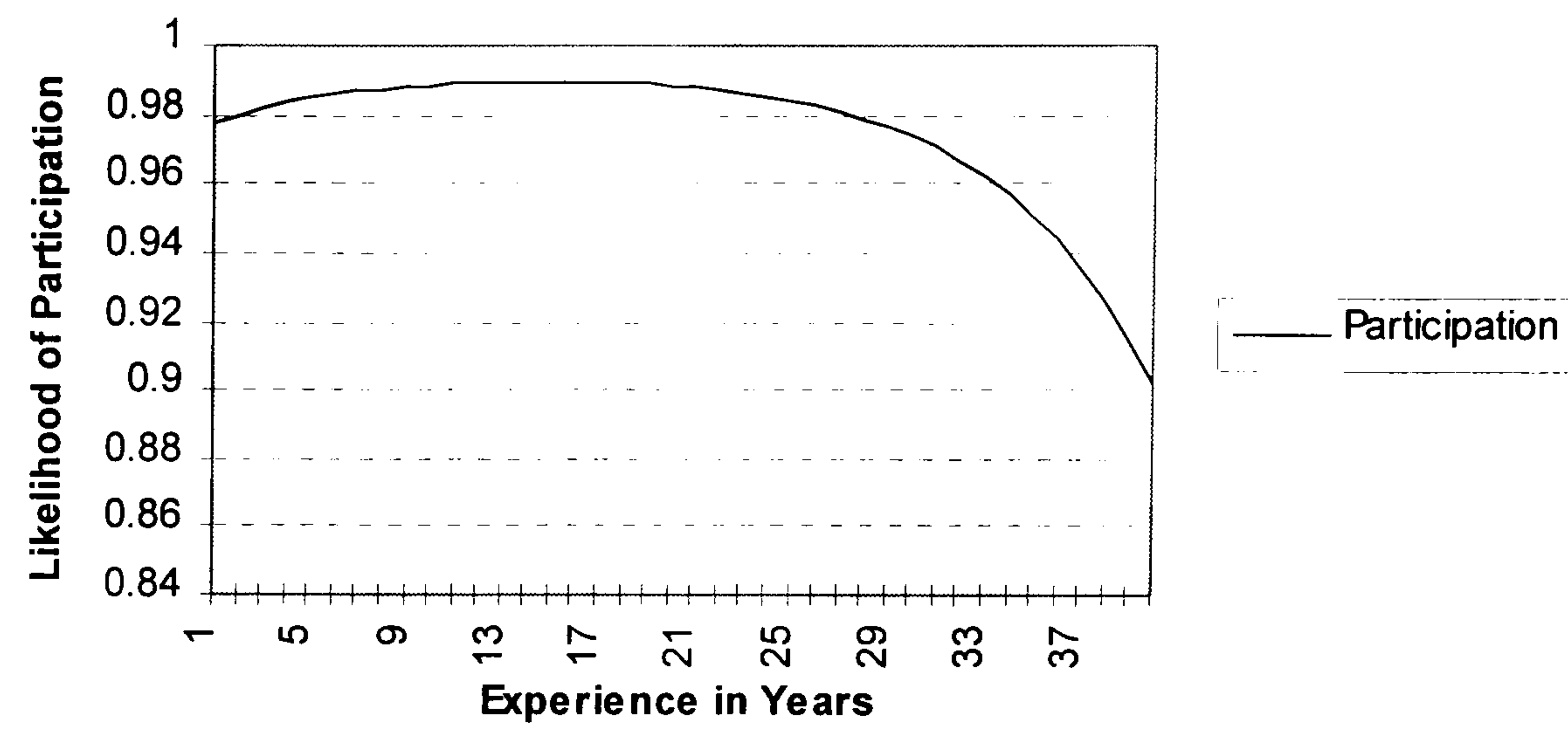


Figure 7.4 Male Participation by Non-Labour Income, 1984

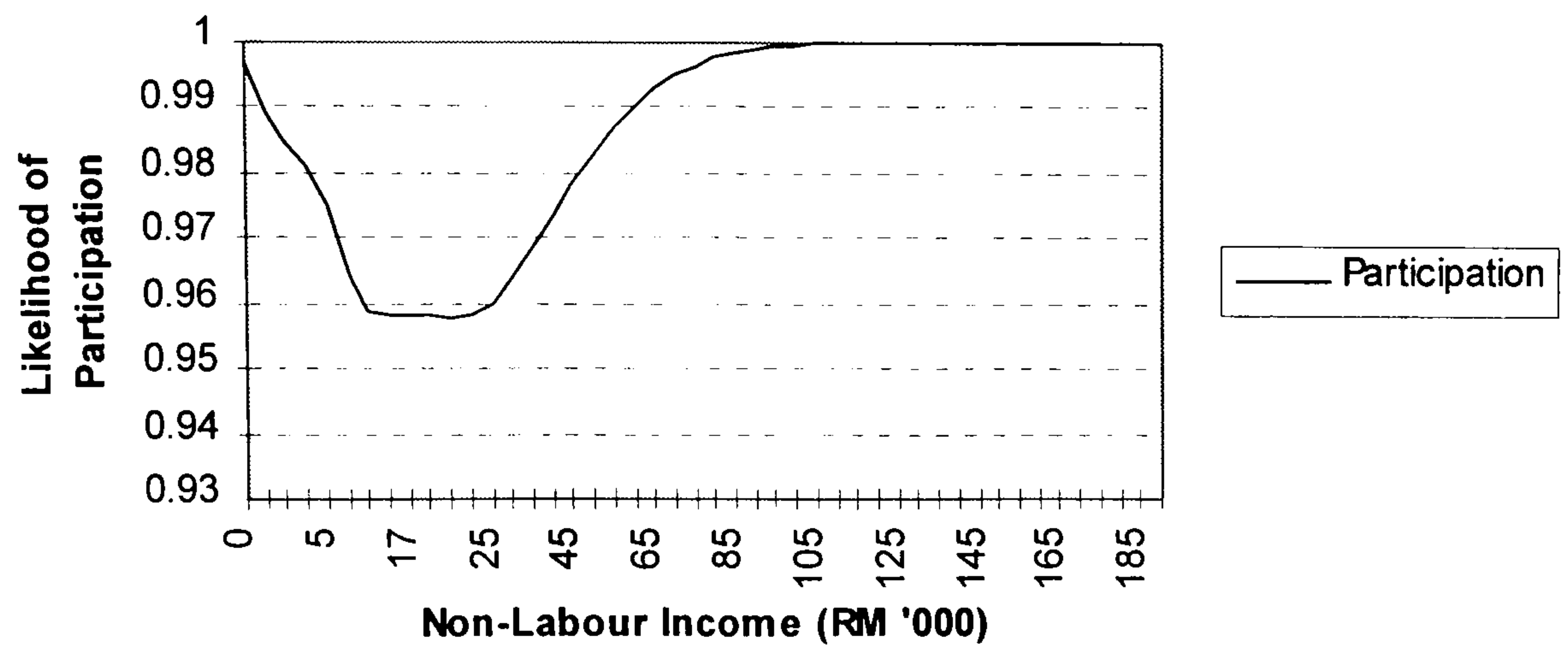
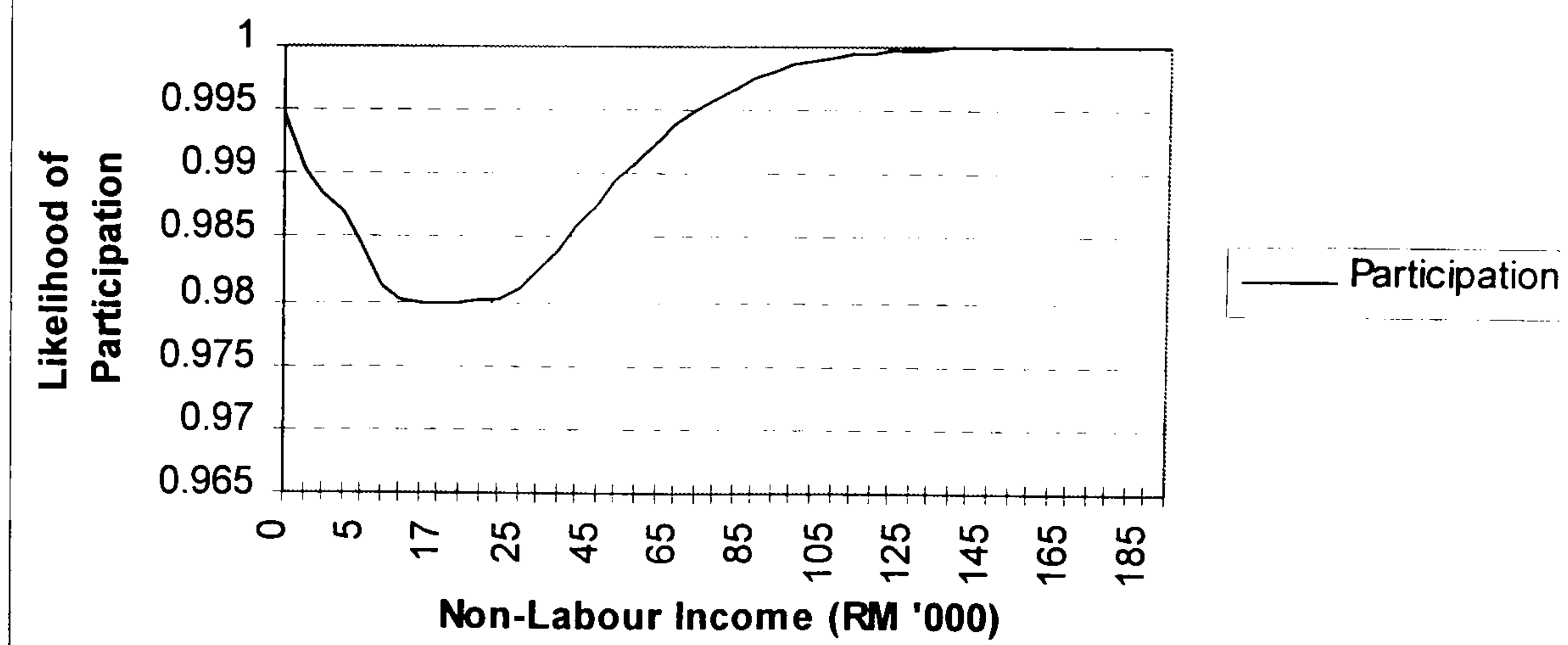


Figure 7.5 Male Participation by Non-Labour Income, 1992



for the other variables. In other words, the graph for 1984 shows the participation likelihood of a rural male head of household who had a non-labour income of RM3,300 and lower secondary education. The plots for 1984 and 1992 show an inverted U shape, where the participation likelihood rises to a maximum around 15-17 years of experience before declining as a result of attrition and retirement from the labour market.

Figure 7.4 and Figure 7.5 show the result of plotting the male participation against different levels of non-labour income after tax (NLAB) for 1984 and 1992, with the other explanatory variables evaluated at the mean. The non-labour income component is estimated using net non-labour income and its square root form. This graph is for a rural male head of household with 22.3 years of experience and lower secondary education. The male participation likelihood dips slightly as the annual non-labour income after tax rises to RM17,000-19,000. After this level, the likelihood of male participation is an increasing function of non-labour income. This means that for most of the non-labour income spectrum, a male is more likely to participate as his non-labour income increases. The working males with larger non-labour income are also those with income derived from property as well as working spouses, since the spouse's income is included in the calculation of his non-labour income.

As shown in Table 7.6, the education dummies for primary (PRIM), lower secondary (LSEC), upper secondary (USEC) and tertiary (TER) levels have positive signs, indicating that those with education are more likely to participate than the reference group, which is constituted of those without education. The participation likelihood tends to increase with years of education, except for those with primary education where the likelihood of participation is higher than those with secondary education. Since education may be viewed as an investment in human resource in which costs are incurred in the short run in return for higher benefits in the long run, there is greater opportunity cost for those with higher levels of education who are unemployed. The participation likelihood of males with primary education is higher than those with lower secondary education. One reason for this is that males with primary education are largely involved in agricultural, production and service-oriented occupations where little

TABLE 7.6 MALE PARTICIPATION EQUATION

Probit

Variable	*1984* *Coefficient*	*1984* *Std. Error*	*1992* *Coefficient*	*1992* *Std. Error*
Constant	1.8482	0.2900	1.8700	0.2942
EXPRC	0.0708	0.0288	0.0471	0.0232
EXPRC2	-0.0020	0.0004	-0.0016	0.0004
NLAB	0.0518	0.0172	0.0293	0.0050
NLABSQR	-0.4496	0.0810	-0.2429	0.0437
PRIM	0.3064	0.1146	0.5115	0.1025
LSEC	0.2704	0.1349	0.4553	0.1160
USEC	0.7525	0.1629	0.7371	0.1278
TER	0.7087	0.1953	1.0919	0.1704
URB	* -0.1258	0.0771	* -0.0533	0.0696
Log Likelihood	-675.61		-830.87	
Chi-Squared	172.59		216.45	
Participation rate (%)	97.5		97.5	

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

technical and literacy skills are needed. In this case, the lack of education is no deterrence to participation. It is also possible that those who are engaged in agricultural, production and service-oriented occupations early in their lives either did not have the opportunity for education or saw no need to continue with their education. Males in urban areas (URB) are less likely to participate than their counterparts in rural areas, but these coefficients are not significant at the 5 per cent level.

6.1.2 Female

The age variable in its quadratic form is used in the participation function for females. When deriving the model, the cubic form was attempted but was found to be no better than the quadratic form. After controlling for other factors such as non-labour income, education, age of children and strata, the likelihood of female participation rises gradually with age, reaching a maximum at 39.5 years before declining thereafter. The graphs for 1984 and 1992, as shown in Figure 7.6 and Figure 7.7, refer to rural female heads of household with lower secondary education and a non-labour income of RM12,100 (1984) and RM15,200 (1992).

Figure 7.6 Female Participation by Age, 1984

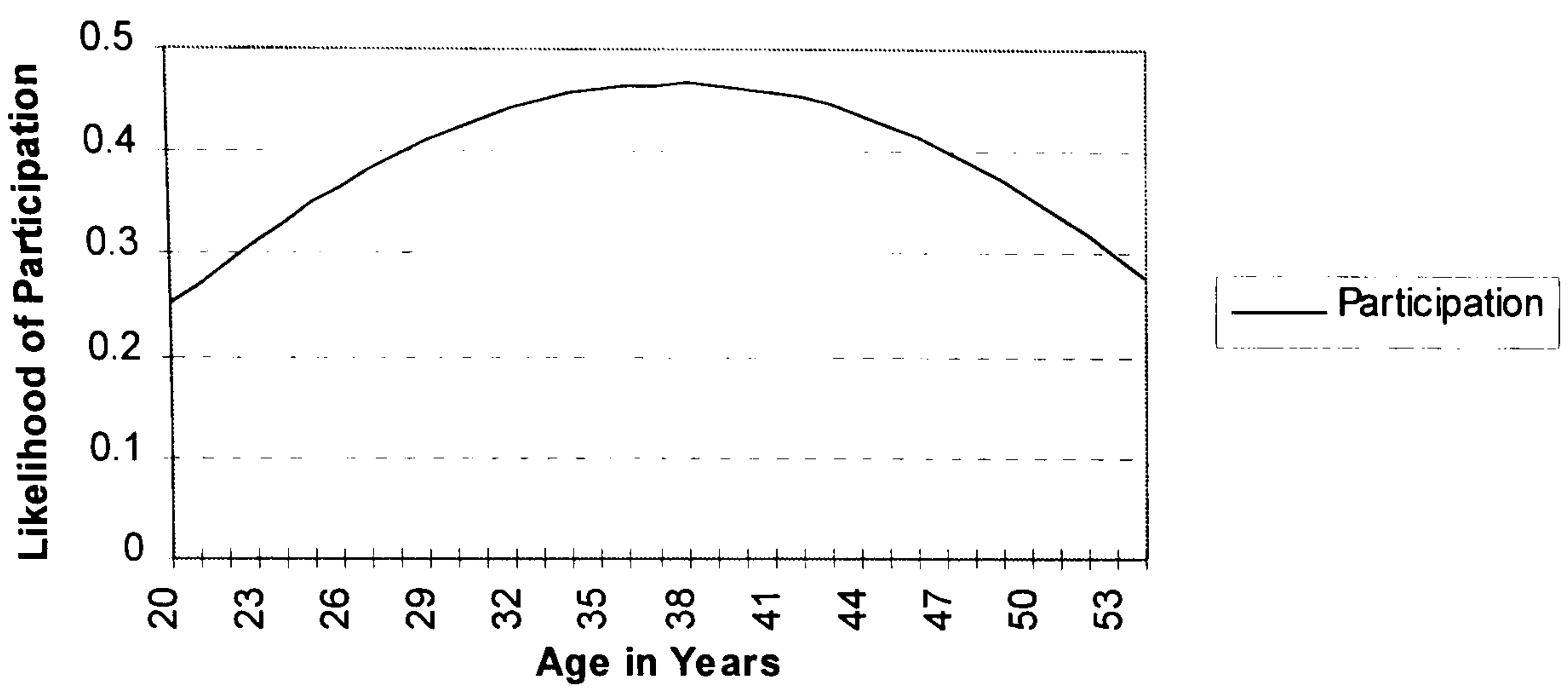


Figure 7.7 Female Participation by Age, 1992

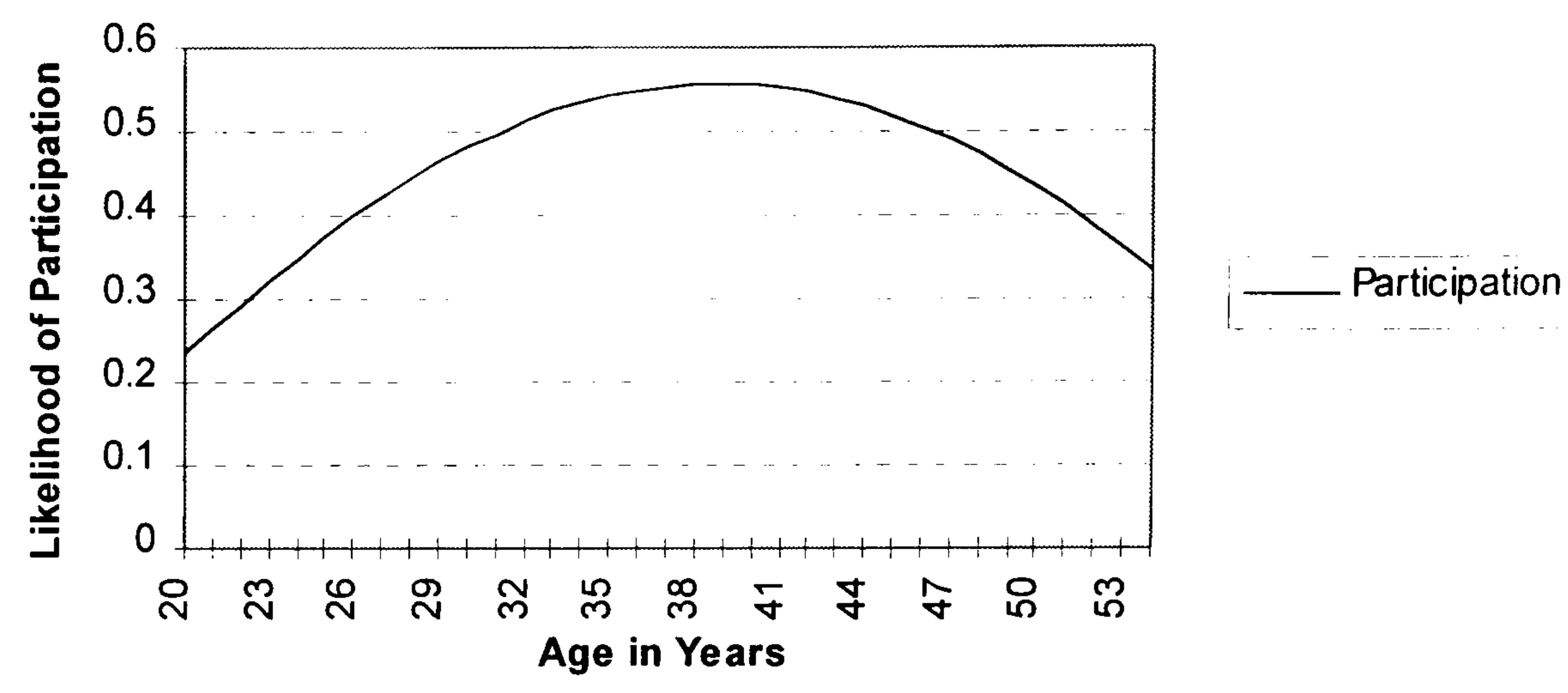


Figure 7.8 Female Participation by Non-Labour Income, 1984

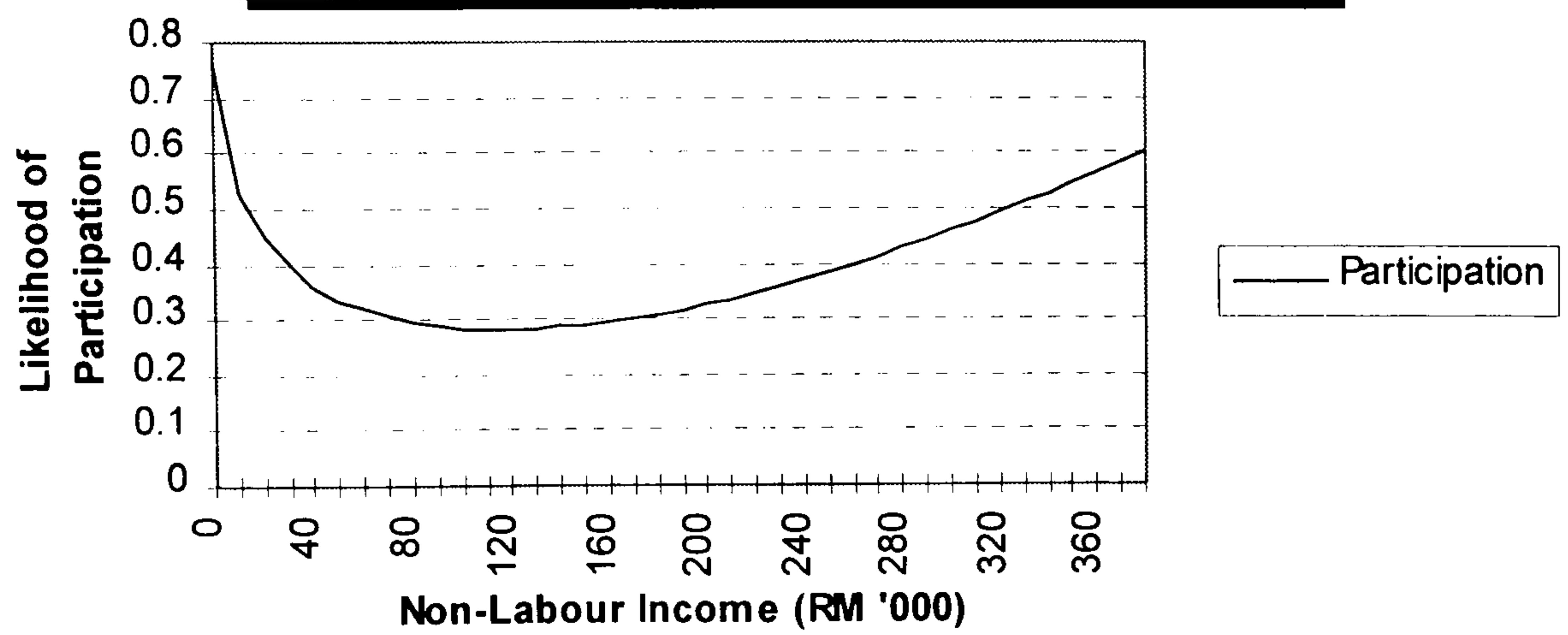


Figure 7.9 Female Participation by Non-Labour Income, 1992

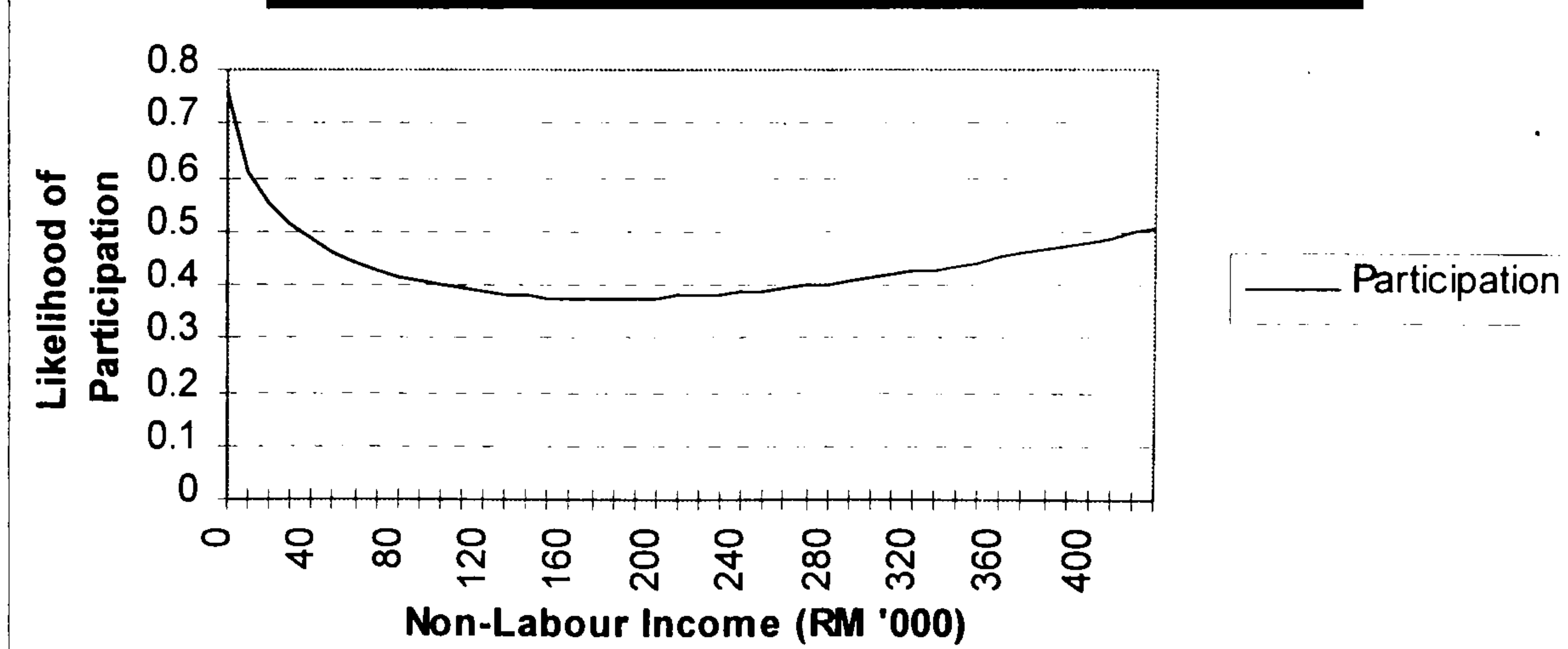


TABLE 7.7 FEMALE PARTICIPATION EQUATION

Probit

Variable	*1984*		*1992*	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Constant	-1.9479	0.2875	-3.0891	0.2778
AGE	0.1424	0.0163	0.1897	0.0157
AGE2	-0.0018	0.0002	-0.0024	0.0002
NLAB	0.0111	0.0022	0.0059	0.0020
NLABSQR	-0.2397	0.0237	-0.1560	0.0231
PRIM	-0.1443	0.0393	* 0.0146	0.0407
LSEC	-0.1198	0.0549	* 0.0725	0.0502
USEC	0.6963	0.0583	0.5864	0.0525
TER	1.1984	0.0883	1.4381	0.0726
Ch1	-0.3411	0.0336	-0.3953	0.0323
Ch2	-0.1324	0.0421	-0.2324	0.0396
Ch3-5	-0.0529	0.0245	-0.1512	0.0232
Ch6-11	-0.0619	0.0167	-0.0653	0.0149
Ch12-16	* 0.0329	0.0186	* 0.0144	0.0180
Urban	-0.2730	0.0316	-0.2039	0.0299
Log-likelihood	-4966.2		-5863.3	
Chi-squared	911.0		1072.1	
Participation rate (%)	38.4		39.7	

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

The relationship between the likelihood of female participation and non-labour income follows a distinct U-shape (see Figure 7.8 and Figure 7.9). Female participation likelihood declines rapidly as the net annual non-labour income rises to around RM120,000 in 1984 and RM170,000 in 1992. Assuming minimal property income for an average non-working female, these levels of non-labour income would correspond to a monthly salary of about RM1,000-RM1,400 for her husband, which place them within the middle income category. Female participation likelihood increases if the non-labour income falls below or increases above this level. Females with low non-labour income are more likely to work in order to supplement their family income. On the other hand, females with higher levels of non-labour income tend to have higher participation likelihood as well. The reason for this is that females with higher levels of non-labour income (which implies that their spouses earn high salaries, often as a result of better education) have greater incentive to work because they also tend to have better education and can command higher wages. In a society where education is linked with social status and earning power, better educated women tend to marry husbands who have either an equivalent or higher educational attainment.

As shown in Table 7.7, the coefficients of the education dummies for 1984 are negative for primary and lower secondary education and positive for upper secondary and tertiary education. In 1992, the coefficients for all the education dummies are positive though the coefficient for PRIM and LSEC are insignificant at the 5 per cent level. The likelihood of female participation increases at USEC and TER for both the years. The children dummies refer to women having at least a child at or below the age 1 (CH1), at the age 2 (CH2), as well as between ages 3-5 years (CH3_5), 6-11 years (CH6_11) and 12-16 years (CH12-16). As expected, young children have a strong disincentive effect on a woman's participation, especially for children below 5 years old. Children at this age make strong demands on their mother's time, care and attention. The disincentive effect becomes less pronounced with older children. In fact, women with older children above the age of 12 years are more likely to work since children at these ages can help out with household chores.

As with the males, the urban dummy for females has a negative sign, implying higher participation for rural females. The higher likelihood of female participation in the rural areas is because females in the rural areas are able to perform their household activities alongside working in the farm, which are often family owned. Unlike urban jobs, it is much harder to distinguish participation from non-participation in the case of agricultural occupations because of the greater degree of disguised unemployment and underemployment. In addition, the inflow of rural migrants to urban areas in search of jobs contribute to a higher rate of urban unemployment, and hence the lower participation likelihood for urban females.

6.2 Instrumenting for Wage and Virtual Income

6.2.1 Baseline wage equation

The wage equation is estimated as an instrument for the hours of work equation in order to overcome the problem of endogeneity. The dependent variable, net wage, is expressed in log form, thereby giving a semi-logarithmic relationship to the model. The semi-log specification was found to be appropriate after trying out several model specifications in the initial stage of the regression runs.

Two alternative sets of variables are used for the baseline wage equation. The first alternative (ALT1) assumes that unlike wage after tax which is clearly related to hours of work put in by an individual, gross wage rate and non-labour income are independent of the amount of hours worked. This is consistent with the view that in a competitive market for homogenous labour, individuals confront a fixed market wage offer. This assumption is implicit in the models by Flood and MaCurdy (1992) and Blomquist (1996) who used gross wage rate and non-labour income in some of their models to instrument for the net wage rate in Sweden. The independent variables in the baseline wage equation are wage, wage square root (WAGESQR), non-labour income (NLAB), non-labour income square root (NLABSQR), experience or age, and lamda to adjust for selection bias.

In the second alternative (ALT2), we relax the exogeneity assumption for the instrumental variable estimators by excluding gross wage and non-labour income from the wage equation. This alternative uses socio-demographic variables as instruments, namely, potential work experience or age, potential work experience (or age) squared, education, occupation, and lamda. Unlike ALT1, this alternative avoids using gross wage rate which may be affected by the errors made in measuring the amount of hours worked.[5]

It is interesting to note that Flood and MaCurdy (1992) and Blomquist (1996) who used the gross wage rate and non-labour income to instrument for the net wage rate in their models differed in opinion on the relative merits of the instruments. By using gross wage and non-labour income as instruments (as in our ALT1), Flood and MaCurdy were able to replicate the results obtained by using maximum-likelihood procedures. They argued that the 'high' positive value which was derived for the wage rate by

[5] The Alternative 2 wage equation parallels the functional form adopted by Mincer (1974) and Becker (1964) in the human capital earnings function which uses years of schooling and post-schooling experience.

estimators like IV1 was due to the endogeneity of the gross wage rate and nonlabour income. They favoured an estimator like IV2 which takes care of both the endogeneity in the gross wage rate and nonlabour income as well as the endogeneity in net wage rates imposed by non-linear taxes.

Blomquist, on the other hand, argued that it is difficult to test whether the gross wage rate and non-labour income were admissible instruments. However, when gross wage rate and non-labour income were excluded from the model, his simulations showed that using socio-economic variables as instruments had a serious negative bias for the wage rate coefficient, especially for small samples. The small-sample bias arose because of the weak correlation between the instruments with the net wage rate. Blomquist confirmed Flood and MaCurdy's finding that the model with wage and non-labour income variables performed as well as the maximum likelihood method. In his Monte Carlo simulations, he found that the inclusion of wage and non-labour variables produced a small negative bias in the wage rate coefficient when there was a measurement error in the gross wage rate, which was calculated as labour income divided by hours of work. In addition, the estimator performed fairly well if the measurement error in the gross wage is additive (Blomquist, 1996: 403). In our regression estimates, we use both alternatives to ascertain if they produce significantly different results, either in terms of the coefficient estimates obtained or giving rise to a change of signs in the income and substitution effects.

6.2.1.1 Male

Results of the estimates on the instruments for net wages are given in Table 7.8. In Alternative 1, the adjusted R squared statistics are very high and the F distribution statistics are very significant. Log net wage has a quadratic relationship with WAGE and WAGESQR and the very significant t-ratios suggest that wage and wage squared are good instruments for net wage, assuming that there is no problem with endogeneity. The coefficients for NLAB are negative and significant at the 5 per cent level for both the years. The coefficients for the AGE variable, which are used to control for the effect of age on wage, are negative, while the URB coefficients are positive. It appears that

TABLE 7.8 REDUCED FORM EQUATIONS FOR MALE NET WAGES

Alternative I

Dependent Variable: Ln Net Wage

Variable	*1984* Coefficient	*1984* Std. Error	*1992* Coefficient	*1992* Std. Error
Constant	-0.7916	0.0102	-0.8208	0.0093
WAGE	-0.6446	0.0005	-0.5753	0.0005
WAGESQR	1.1867	0.0038	1.2267	0.0037
NLAB	-0.0017	0.0002	-0.0001	0.0000
AGE	-0.0011	0.0002	-0.0007	0.0002
URB	0.0219	0.0035	0.0217	0.0028
Lamda	0.1609	0.0424	* 0.0609	0.0355
F distribution	4109		5458	
Adj. R squared	0.974		0.976	

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

Alternative II

Dependent Variable: Ln Net Wages

Variable	*1984* Coefficient	*1984* Std. Error	*1992* Coefficient	*1992* Std. Error
Constant	0.3871	0.0659	0.6073	0.0646
EXPRC	0.0685	0.0055	0.0614	0.0052
EXPRC2	-0.0012	0.0001	-0.0010	0.0001
LSEC	0.2390	0.0217	0.2294	0.0202
USEC	0.5939	0.0250	0.4845	0.0218
TER	1.2487	0.0341	1.0213	0.0296
SALE	-0.2482	0.0285	-0.3126	0.0277
SER	-0.2558	0.0275	-0.3793	0.0269
AGRI	-0.5243	0.0280	-0.6272	0.0257
PROD	-0.2640	0.0240	-0.3592	0.0225
Lamda	0.6293	0.2198	0.7030	0.2017
F statistics	428		523.1	
Adj. R-squared	0.396		0.400	

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

although urban males have a lower participation likelihood, those who are working have higher net wages than the rural males. The coefficient for selectivity adjustment λ is significant in 1984 but not in 1992. The regression equations have highly significant F statistics and adjusted R squared.

In Alternative II, the three categories of variables used in the model are years of post-school work experience, levels of schooling and occupation. All the t-ratios and F statistics are significant at the 5 per cent level. The adjusted R squared statistics are moderately high where 40 per cent of the variance of log net wage can be explained by the variables in the regression. Experience is expressed in quadratic terms, that is, EXPRC and EXPRC2. Theoretically, this refers to potential experience and acts as a proxy for the acquisition of human capital. It seems to correspond with the assumption that investment in human capital declines linearly with time.[6] The inclusion of experience has been proposed by Mincer (1974) and is considered to be an appropriate proxy for estimating the returns to human capital (Willis and Rosen, 1979).

Since the level of unemployment among Malaysian males is very low, there is little problem associated with using the experience variable for the males. EXPRC and EXPRC2 show the correct sign and are statistically significant. Net wage increases with years of experience and reaches the maximum at 28.5 years for 1984 and 30.7 years in 1992,[7] before declining (see Figure 7.10 and Figure 7.11). The charts refer to an average male with lower secondary education in the reference group occupation. The reasons for the decline are physical deterioration in strength and health, and the vintage effects. Workers of an older cohort tend to be less in touch with the modern world and less amenable to acquire new knowledge and skills compared with those in younger cohorts.

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[6] For the proof, see Fallon and Verry (1988: 149-50).

[7] The maximum value of the wage function with respect to experience can be calculated from the derivatives of the function. For instance, the maximum for 1984 occurs at $0.0685 / (2 \times 0.0012) = 28.5$ years.

Net Wage by Experience and Age

Figure 7.10 Male Net Wage by Experience, 1984

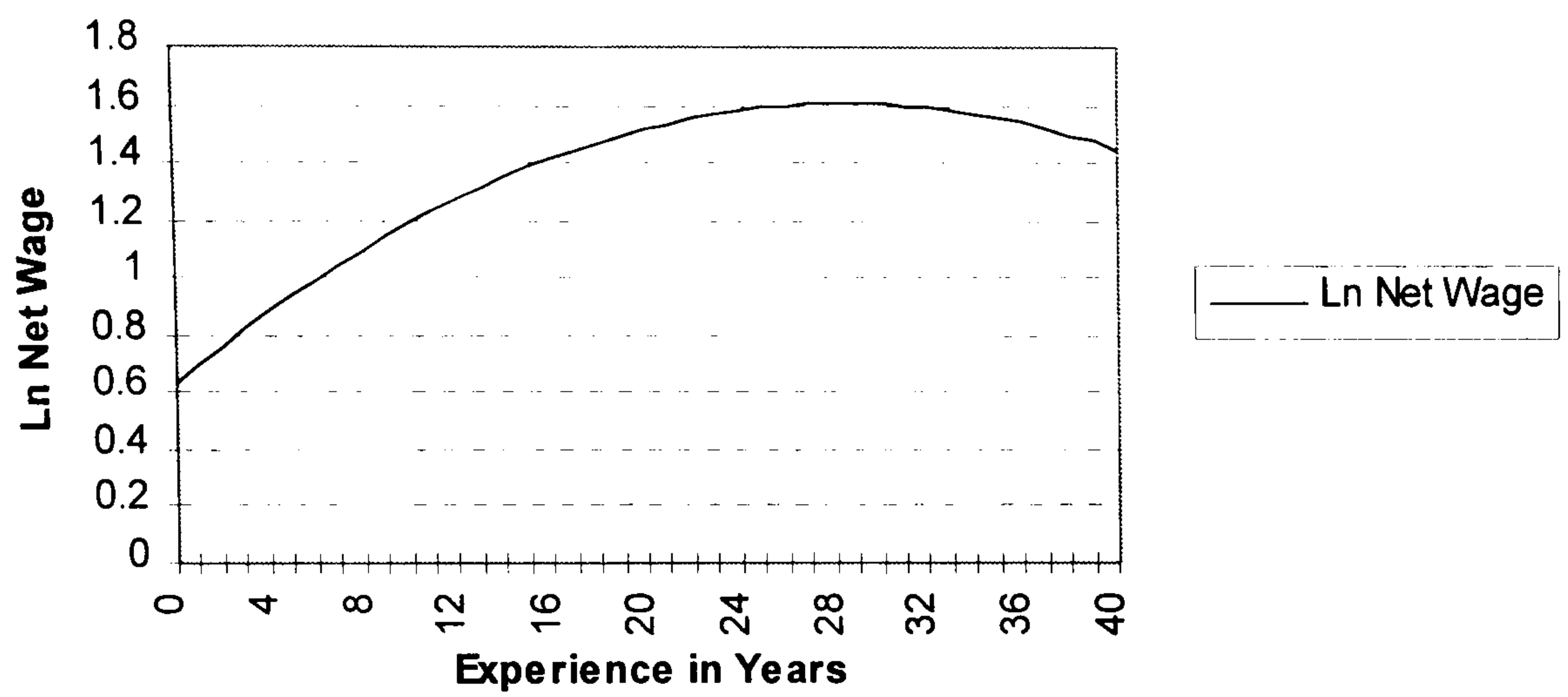


Figure 7.11 Male Net Wage by Experience, 1992

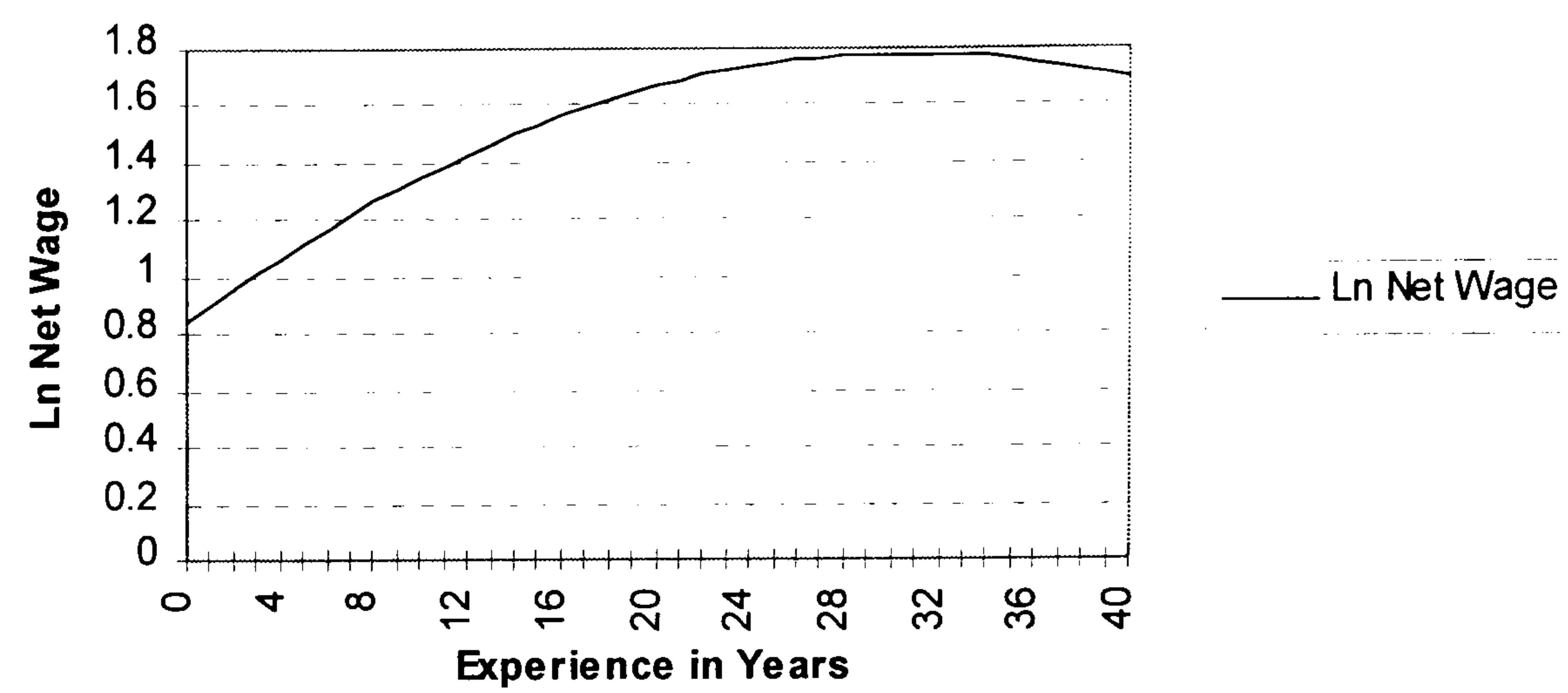


Figure 7.12 Female Net Wage by Age, 1984

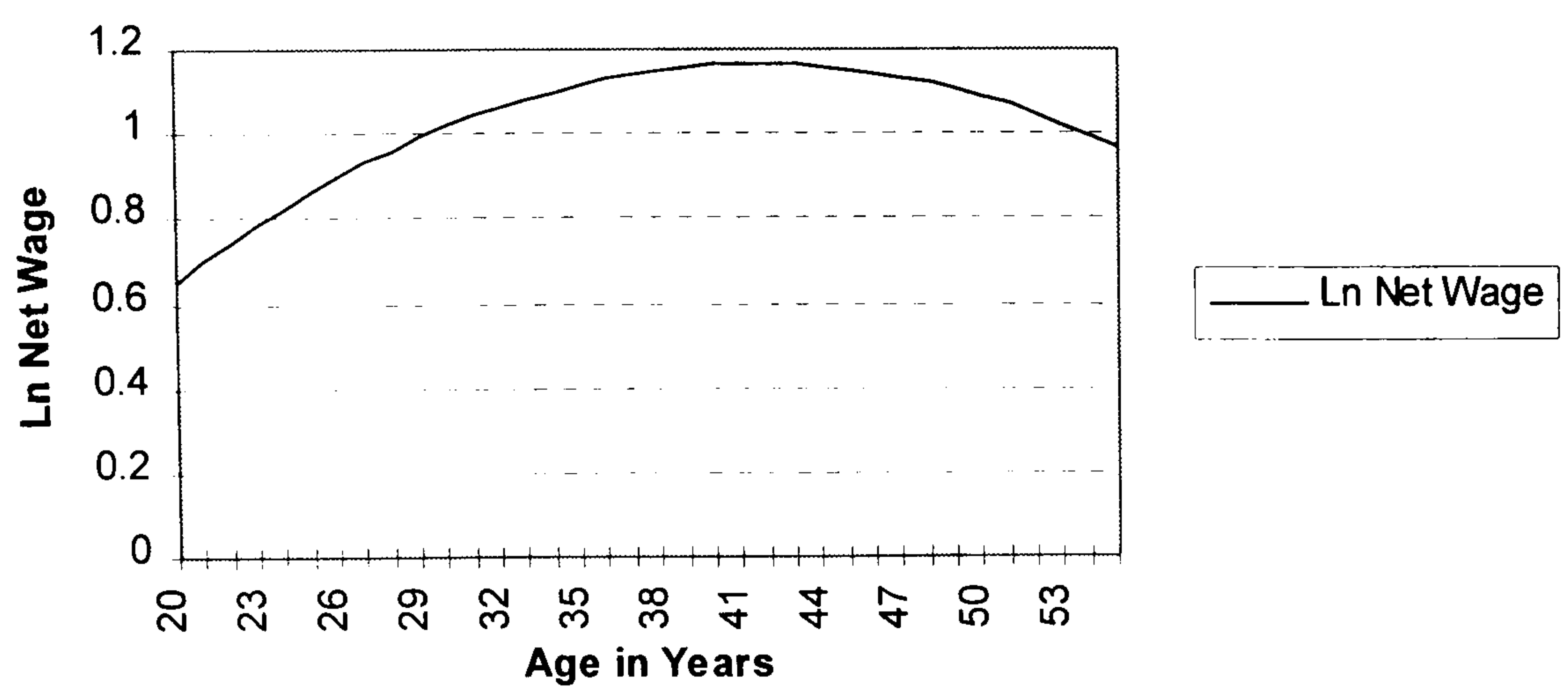
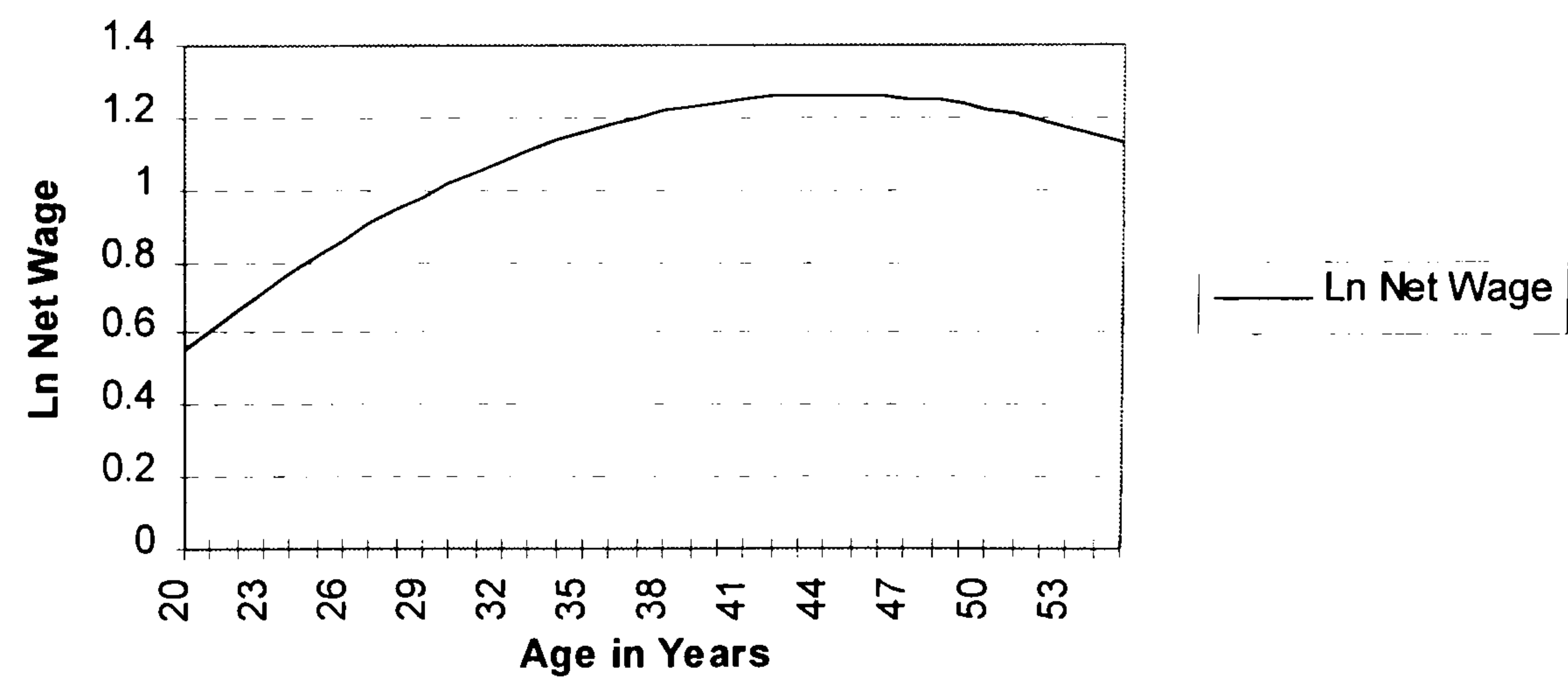


Figure 7.13 Female Net Wage by Age, 1992



Education measures the formal acquisition of human capital. In the regression, education dummy variables are used to capture the effect of the level of highest educational attainment on wages. This coefficient for each dummy variable reflects the return to each level of schooling compared with the reference category of those having primary or no education. The coefficients are positive and highly significant, which means that workers with higher education have a clear advantage over those with lower education in earning higher wages. The coefficients for those with lower secondary education are 23.9 per cent in 1984 and 22.9 per cent in 1992. This means that the return to lower secondary education is around 24 per cent higher than those with primary or no education. The return to upper secondary education is more than double that from lower secondary education, while the return to tertiary education is in turn double that from upper secondary education. The increasing returns to higher levels of education corresponds with the studies by Demery and Chesher (1993 on the Malaysian data. [8] Whether the role of education is to augment productivity or used for screening out those with innate abilities, there is no doubt that employers pay a premium to those who are better educated.

Occupation is an important factor accounting for the variation in earnings among workers. The coefficients for the occupational dummies show the net wages of workers in various occupational groups compared with the reference group, which comprises the professional, technical, managerial and clerical occupations. Compared with the reference group, those involved in sales, service and production occupations earn about 25 per cent lower in 1984 and their relative wages were lower in 1992 by 31-38 per cent. Workers in agricultural occupations saw the worsening of their relative wage which declined from the level of 52 per cent of the reference group average wage in 1984 to 63

[8] This finding on Malaysia differs from Psacharopoulos (1984) who maintains that the private rate of return to education in developing countries is highest at the primary level and the interest of these countries are best served by improving the quality of primary education rather than making expensive investments in higher education.

TABLE 7.9 REDUCED FORM EQUATIONS FOR FEMALE NET WAGES

Alternative I

Dependent Variable: Ln Net Wages

Variable	1984 Coefficient	1984 Std. Error	1992 Coefficient	1992 Std. Error
Constant	* -0.0527	0.0312	-0.2612	0.0287
WAGE	0.0205	0.0024	-0.0192	0.0004
WAGESQR	0.5929	0.0090	0.7598	0.0051
NLAB	-0.0034	0.0006	-0.0008	0.0000
NLABSQR	0.0837	0.0067	0.0590	0.0031
AGE	-0.0019	0.0005	0.0012	0.0005
URB	* 0.0194	0.0103	* 0.0096	0.0092
Lamda	-0.2409	0.0185	-0.1901	0.0156
F statistic	4740.8		7369.8	
Adj.R-squared	0.913		0.931	

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

Alternative II

Dependent Variable: Ln Net Wages

Variable	1984 Coefficient	1984 Std. Error	1992 Coefficient	1992 Std. Error
Constant	-0.9663	0.2083	-1.3789	0.2511
AGE	0.0915	0.0097	0.1064	0.0113
AGE2	-0.0011	0.0001	-0.0012	0.0001
LSEC	0.2275	0.0323	0.2825	0.0302
USEC	0.4637	0.0430	0.5957	0.0374
TER	1.1621	0.0561	1.2286	0.0568
SALE	-0.7571	0.0383	-0.7407	0.0369
SER	-0.6473	0.0383	-0.6978	0.0374
AGRI	-0.8263	0.0394	-0.8984	0.0386
PROD	-0.5804	0.0388	-0.6034	0.0350
Lamda	0.1632	0.0456	0.2855	0.0533
F statistic	455.1		548.5	
Adj.R-squared	0.592		0.591	

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

per cent in 1992. The t-ratios for these variables and the coefficient for lamda for 1984 and 1992 are significant at the 5 per cent level.

6.2.1.2 Female

The regression results of the two alternative specifications used for instrumenting net wages are given in Table 7.9. Under Alternative I, the coefficients for WAGE, WAGESQR, NLAB, and NLABSQR are highly significant. The AGE coefficients for 1984 and 1992 are significant at the 5 per cent level. The urban dummy variable indicates that the females in urban areas enjoy slightly higher wages than the rural females but these coefficients are not significant.

The model specification for Alternative II for the females is similar to that for the males except that the age and age squared variables are used in the place of the experience and experience squared variables. The plots of female log net wage by age for 1984 and 1992 are shown in Figure 7.12 and Figure 7.13. The charts refer to an average female with lower secondary education and engaged in the reference group occupation. Net wage rises gradually as age increases from 20 years to 41 years in 1984 (44 years in the case of 1992), before declining. The education variables show that the females receive wage premium for increasing levels of education. In fact, the female wage increments for education attainments above the primary level in 1992 are even greater than for the males.

After controlling for age and education, the relative net wages received by females in the sales, service, and production occupations are equivalent to 60-75 per cent of the reference occupations average net wage.[9] For females in the agricultural occupations, their average net wage are even lower at 80-90 per cent of the reference group wage. The worsening of the relative wages among occupations during 1984-92 is most marked for agricultural and service occupations. The coefficients on λ are statistically significant which shows evidence of self selection. The adjusted R squared is 59 per cent and the F statistic is highly significant at the 5 per cent level.

[9] The reference occupations refer to professional and technical, managerial and administrative, and clerical occupations.

6.2.2 Virtual income

Virtual income is the intercept of the linearised budget set at zero hours of work. Hall (1973), who was one of the first to use the technique to linearise the budget set, treated marginal tax rate and virtual income as exogenous. This can be a problem since virtual income is determined by the level of non-labour income as well as the net wage rate, which in turn depends on the hours worked and marginal tax rates. The linearised budget set is endogenous with respect to hours of work.

Subsequent studies adopted several strategies to overcome this problem of endogeneity. Rosen (1976) and Hausman and Wise (1976) used the same level of hours of work for all individuals to derive the marginal tax rate in the construction of net wage rates and virtual incomes. Layard, Barton and Zabalza (1980) adopted the two-stage least squares approach. In the first stage, they regressed a dummy variable for taxpayers t on ln W, V and Z. They then used the predicted t instead of the actual t to estimate the hours of work equation. The instrumental variables approach was used by Johnson and Pencavel (1982), who replaced the right-hand side variables of the hours of work equation with their corresponding predicted values from prior regressions on a set of exogenous variables.

To be consistent with our approach in dealing with the endogeneity of net wages, we adopt a similar procedure to instrument for virtual income. In the regression equation, virtual income is regressed against gross wage and non-labour income assumed to be independent of the amount of hours worked. As shown in Table 7.10, the regression results of the virtual income equation are highly significant. The high adjusted R-squared in the regressions for males and females implies that the model came very close to explaining almost all of the variations in virtual income.

TABLE 7.10 REDUCED FORM EQUATIONS FOR VIRTUAL INCOME

Male

Dependent variable: Virtual Income

Variables	*1984*		*1992*	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Constant	0.4950	0.0394	0.6264	0.0334
WAGE	-0.0869	0.0033	-0.1366	0.0028
NLAB	0.8025	0.0038	0.9848	0.0011
Lamda	3.8204	0.5455	-3.4768	0.1327
F statistic	34157		54410	
Adj.R squared	0.940		0.995	

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

Female

Dependent variable: Virtual Income

Variables	*1984*		*1992*	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Constant	* 0.1357	0.0968	-0.7149	0.1344
WAGE	-0.0963	0.0079	-0.0420	0.0038
NLAB	0.9128	0.0016	0.9943	0.0005
Lamda	0.5790	0.0970	0.3210	0.1410
F statistic	118625		1214186	
Adj.R squared	0.991		0.999	

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).
The fact that we are using WAGE, NLAB and lamda as instruments for virtual income as well as net wages (see Table 7.8 and Table 7.9) does not present an identification problem since the predicted values for virtual income will be a different linear combination of these variables from their contribution to the net wage equation.

6.3 Baseline Hours Equation

The hours equation adopts the simple functional form that is derived from an indirect utility function and may be written as

$$H_i = a_0 + a_1 \ln \hat{W}_i + a_2 \hat{V}_i + a_3' Z_i + a_4 \lambda + \varepsilon_i \qquad (28)$$

where H_i is the ith person's hours of work, $\hat{W}_i$ is the predicted wage rate, $\hat{V}_i$ is the predicted virtual income, $\boldsymbol{Z}_i$ is a vector of additional control variables (such as age, experience, education, age and number of children, occupation, and strata), λ is the inverse Mill's ratio, and ε_i is the stochastic disturbance term. Since this equation includes the participating *subset* of the sample, the inverse Mills ratio must be included to correct for selectivity bias. Accordingly, this equation incorporates the statistical control for self-selection into the labour force as well as exogeneity assumptions on the regressors, namely, wage after tax and virtual income, through the use of the two-stage least squares (2SLS) instrumental variable procedure.

The uncompensated wage effect and the substitution effect of a unit change in wage rate on hours worked have traditionally been presented in terms of elasticity. It is useful to present the regression results in this form to facilitate comparability with the other studies. The two elasticities can be computed as

$$\text{Uncompensated wage elasticity} = \frac{\partial \ln H_i}{\partial \ln W_i} = \frac{a_1}{H_i} \qquad (29)$$

$$\text{Income elasticity} = \frac{\partial \ln H_i}{\partial \ln V_i} = \frac{a_2 V_i}{H_i} \qquad (30)$$

6.3.1 Male

Estimation results of the hours of work equation for males under the two alternatives are presented in Table 7.11. To facilitate discussion, the baseline hours of work equation using Alternative 1 instrumental variables is denoted by BASE1 while the baseline estimate using Alternative 2 is denoted as BASE2. The two alternatives yield coefficients with roughly similar signs except for production workers. In the four regression estimations, the sign for the uncompensated wage effect is negative, while that for the income effect is positive. The negative sign for the uncompensated wage effect indicates a inverse relationship between hours worked and wages, while a positive income effect seems to be inconsistent with the assumption that leisure is a normal good. These two issues will be taken up later in Section 8 of this chapter.

The difference in the estimates between BASE1 and BASE2 indicates the range of values resulting from different instrumental variables assumptions. In 1984 the coefficients for LWAGETAX are -7.2 under BASE1 and -2.7 under BASE2, a difference of 4.5 hours per week. The difference in 1992 narrows to 3.2 hours per week. The effect of virtual income on male labour supply is negligible. Under BASE1 estimates, an

TABLE 7.11 MALE HOURS OF WORK EQUATION

All Hours – Alternative 1

BASE1

Variables	1984 Coefficient	1984 Std. Error	1992 Coefficient	1992 Std. Error
Constant	56.9760	0.5750	58.9770	0.5673
LWAGETAX	-7.2022	0.2414	-5.7055	0.2223
YVIR	0.1615	0.0324	0.0237	0.0085
TEACH	-9.9790	0.9084	-10.3350	0.7735
SALE	5.5599	0.5955	2.9060	0.5726
SER	2.6260	0.5671	2.0319	0.5577
AGRI	-10.5540	0.5666	-10.4640	0.5103
PROD	* -0.3315	0.4781	* -0.3160	0.4438
Lamda	-8.0103	3.1900	-7.1365	2.7450
F statistic	250		237	
Adj.R squared	0.235		0.195	

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

All Hours – Alternative 2

BASE2

Variables	1984 Coefficient	1984 Std. Error	1992 Coefficient	1992 Std. Error
Constant	49.1820	1.0930	52.5570	1.1970
LWAGETAX	-2.6884	0.5714	-2.4618	0.5720
YVIR	* 0.0239	0.0338	* 0.0102	0.0086
TEACH	-11.1530	0.9490	-11.2040	0.7972
SALE	7.7873	0.6735	4.8612	0.6648
SER	5.1912	0.6590	4.2902	0.6711
AGRI	-6.6113	0.7725	-7.1400	0.7779
PROD	2.4837	0.6009	2.1740	0.6053
Lamda	* -0.4928	3.3280	* -5.4266	2.7970
F statistic	189		194.6	
Adj.R-squared	0.188		0.165	

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

TABLE 7.12 LABOUR SUPPLY ELASTICITIES AFTER TAX

1984

	Uncompensated Wage Elasticity	*Compensated Wage Elasticity*	*Income Elasticity*
Male–Alt. 1	-0.157	-0.167	0.010
Male–Alt. 2	-0.059	-0.058	* 0.001
Female–Alt. 1	-0.384	-0.455	0.071
Female–Alt.2	* 0.064	* 0.025	0.039

1992

	Uncompensated Wage Elasticity	*Compensated Wage Elasticity*	*Income Elasticity*
Male–Alt. 1	-0.120	-0.120	0.000
Male–Alt. 2	-0.052	-0.052	* 0.000
Female–Alt. 1	-0.228	-0.229	* 0.001
Female–Alt.2	* -0.070	* -0.070	0.000

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

increase of RM10,000 in virtual income will bring about an increase of 1.6 hours per week in 1984 but less than half an hour per week in 1992. The virtual income coefficients under BASE2 are no different from zero at the 5 per cent level for both years.

Teachers work around 10 hours less per week than the reference occupational group, which comprises other professional and technical workers,[10] managers and administrators, and clerical workers. As mentioned earlier in Section 2.5, this arises because of the way teaching hours are calculated in the LFS, rather than an indication that teachers put in less hours of work. The other occupational group that registers less hours of work than the reference group is agricultural workers. They are estimated to work less than 11 hours per week under BASE1 and 7 hours per week under BASE2. In contrast, sales and service workers tend to work longer hours per week under the two alternative estimations. The inverse Mill's ratio λ is significant under BASE1 but not under BASE2.

[10] Teachers are classified under the Professional and Technical Workers in the Dictionary of Occupational Classification but treated separately in the regression model.

TABLE 7.13 FEMALE HOURS OF WORK EQUATION

Alternative 1

BASE1

Variables	*1984*		*1992*	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Constant	51.9390	1.3420	55.3110	1.1650
LWAGETAX	-6.0942	0.5807	-3.8500	0.3969
YVIR	0.0968	0.0201	* 0.0013	0.0030
CH1	*-0.1290	0.6970	*-0.2204	0.6065
CH2	* 0.7802	0.8156	*-0.5675	0.6959
CH3_5	-1.2038	0.4479	-0.8720	0.3851
TEACH	-11.7310	1.3120	-12.8000	0.9095
SALE	5.4632	1.1460	2.1653	0.9194
SER	* 0.2789	1.0720	*-1.1342	0.8872
AGRI	-11.8760	1.0240	-15.0060	0.8795
PROD	-6.4433	1.0710	-5.1627	0.8147
Lamda	-3.3934	1.2550	-3.7242	1.0500
F statistic	66.6		82.0	
Adj.R-squared	0.187		0.190	

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

Alternative 2

BASE2

Variables	*1984*		*1992*	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Constant	44.8890	2.9250	50.2610	2.7840
LWAGETAX	* -1.0258	1.7210	* -1.1878	1.2800
YVIR	0.0540	0.0217	* 0.0002	0.0030
CH1	* -0.4504	0.7325	* -0.3137	0.6643
CH2	* 0.6309	0.8305	* -0.5348	0.7122
CH3_5	-1.5614	0.4535	-0.9255	0.3974
TEACH	-15.173	1.3940	-13.7410	0.9144
SALE	9.2537	1.8840	4.5424	1.5090
SER	* 3.0640	1.7400	* 0.8011	1.4840
AGRI	-7.0902	2.1270	-11.6600	1.8520
PROD	-4.1081	1.6700	-3.4930	1.3880
Lamda	* -1.1782	1.4590	* -2.2883	1.3190
F statistic	54.4		74.1	
Adj.R-squared	0.158		0.175	

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

As shown in Table 7.12, the uncompensated wage elasticities are low under both alternatives. They are –0.157 in 1984 and –0.120 in 1992 under BASE1. When socio-demographic variables are used as instruments for net wage for BASE2, the uncompensated wage elasticities become even more inelastic at around –0.05. The income elasticities are very small or zero under both alternatives.

6.3.2 Female

Table 7.13 shows the hours of work estimations under the two alternatives. The F statistics and adjusted R-squared for 1984 and 1992 are generally similar under the two alternative assumptions. The coefficients for LWAGETAX are significant under BASE1 but not under BASE2. In the case of virtual income, the estimated coefficients are significant but very small for 1984. The change in virtual income has to be very large for there to be some effect on female labour supply. For instance, the virtual income in 1984 has to change by RM100,000 before registering a change of 10 hours per week for the females under ALT1 and 5 hours per week under ALT2. In 1992 the change in female labour supply arising from a change in virtual income will not be significantly different from zero for both alternatives.

It appears that while the presence of young children reduces the likelihood of female participation, they do not affect the working hours of mothers who choose to work. However, the coefficients are statistically insignificant and children between the ages of 3 to 5 years would only reduce the working hours of their mothers by one to one and a half hours per week. There appears to be a strong link between occupational groups and hours of work. Females in the teaching, agricultural, and production occupations generally work shorter hours per week than the reference occupational group, while females in the sales and service occupations work longer hours. The difference in hours of work between the two alternatives and for both the years can be substantial for teachers (12-15 hours), agricultural workers (7-15 hours), sales workers (2-9 hours), and production workers (3-6 hours).

In terms of the elasticity estimates, the uncompensated wage elasticities for females under BASE1 are -0.384 for 1984 and -0.228 for 1992, about twice as large as the estimates for the males (see Table 7.12). The female uncompensated wage elasticities under BASE2 are insignificant for both years. The income elasticities are small in 1984 and zero in 1992.

6.3.3 Simultaneous equations and test for exogeneity

Since three sets of instrumental variables are used in the three step procedure to address the problem of endogeneity of net wages and virtual income, it will be useful to test for exogeneity of the instruments. Smith and Blundell (1986) propose that a maximum likelihood procedure could be constructed for models with more than one regressions. We use the LIMDEP programme (Greene, 1992) to estimate the model with instrumental variables, which is:

$$y_1^* = \beta_1'\boldsymbol{x}_1 + \gamma_2 y_2 + \gamma_3 y_3 + \ldots + \varepsilon_1 \quad \text{(Tobit)}$$

where

$$y_2 = \pi_2'\boldsymbol{x}_2 + \varepsilon_2$$

$$y_3 = \pi_3'\boldsymbol{x}_3 + \varepsilon_3$$

Smith and Blundell show that under the null hypothesis, this following procedure is asymptotically equivalent to a score, or Lagrange multiplier test of weak exogeneity. The hypothesis is tested by jointly testing the hypotheses that the slopes on the residuals are 0. This test was applied for the hours of work equation with the two alternative instrumental variables (IV) for net wage, i.e. WAGEFIT1 and WAGEFIT2 and the IV for virtual income (YVIRFIT) for males and females in 1984 and 1992. As shown in Table 7.14, the results of the test show that the hypotheses that there is no simultaneity for males cannot be rejected at the 5 per cent level of significance. In the case of females, the coefficient for WAGEFIT1 and WAGEFIT2 are significant for both years, but YVIRFIT is only significant for 1984 when coupled with WAGEFIT2. However, the insignificant statistics for YVIRFIT for females are related to the insignificant coefficients for virtual income under the two alternatives in 1992.

TABLE 7.14 EXOGENEITY TESTS FOR INSTRUMENTAL VARIABLES

Male

	1984		*1992*	
Variables	*Coefficient*	*Std. Error*	*Coefficient*	*Std. Error*
WAGEFIT1	-43.2440	1.1240	-49.2420	1.0280
YVIRFIT	-0.2754	0.1291	-0.4234	0.1257
WAGEFIT2	-6.0742	0.6153	-4.9506	0.6027
YVIRFIT	-1.0685	0.1390	-1.0089	0.1408

Female

	1984		*1992*	
Variables	*Coefficient*	*Std. Error*	*Coefficient*	*Std. Error*
WAGEFIT1	-19.2990	2.1560	-40.8270	1.7990
YVIRFIT	*0.1077	0.1208	*-0.1724	0.1326
WAGEFIT2	-26.7440	1.3470	-15.7480	0.9468
YVIRFIT	0.4545	0.2182	*0.2192	0.2371

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

6.4 Regression Procedures Using Different Assumptions

The three stage estimation procedure above, or what is referred to as our 'Baseline Estimation', incorporates techniques to control for self-selection as well as alternative exogeneity assumptions on the regressors, and is consistent with the techniques used in second generation labour supply research. For comparative purpose, it might be useful to undertake some estimations using a different set of assumptions in order to ascertain the extent to which selectivity adjustment and the instrumental variables make a difference in the final results. The alternative procedures performed are:

(1) *PROCII*: Regress hours on wages and non-labour income of workers without selection bias adjustment and instrumental variables, as performed in Procedure II of First Generation labour supply research. Compared to the baseline estimation, this procedure is akin to taking a step back and making

the estimations without addressing the selection bias and endogeneity problems.

(2) *PROCIISA*: Regress hours on wages and non-labour income of workers with selectivity adjustments but without use of instrumental variables. As discussed in Chapter 4, the critique against Procedure II is that it suffers from selection bias as well as endogeneity. Accordingly, we perform the same regression but this time addressing the selection bias. The difference between the results of this alternative and the baseline estimates can be attributed to the problems of endogeneity and measurement.

(3) *RESHR1 and RESHR2*: Estimating the hours of work equation for those working between 25-60 hours with selectivity adjustment and adopting the two alternative instrumental variables procedures. The three-stage baseline estimation of labour supply equation parameters is performed for all reported working hours. Measurement errors in hours of work are transmitted to wage measurement. When a respondent reports long working hours for the week, either as a result of overtime work or the difficulty of estimating the number of hours worked for some occupations, this will result in lower estimated wage rate. On the other hand, if a respondent reports short working hours for the week, say in the case of bad weather or slack period for a contract worker, this will cause an upward bias in the estimated wage rate. Errors in reporting hours worked for the week are inevitably transmitted to the estimated wage rate, causing a spurious negative relationship between the hours worked and wage rate. This alternative estimation procedure removes from the sample those who report in working hours at the two ends of the hours spectrum which are more likely to be affected by misreporting. By limiting the analysis to those working between 25-60 hours per week, the sample covers the majority of the workers in regular jobs, namely, around 95 per cent of the working

males and 70 per cent of the working females.[11] The lower limit is set at 25 hours rather than 30 hours so as not to exclude teachers from the sample.

(4) *PRETXSA and PRETXSAIV*: Estimating pre-tax hours of work equation with selectivity adjustment. In the earlier sections, we estimate the labour supply equation parameters after controlling for taxes and using after-tax marginal wage rate and virtual income in the regression equations. We now take a step back by examining how the labour supply function changes before taxes are taken into account. In fact, the bulk of the studies which estimate the parameters of the labour supply function do so without considering taxation. Comparison of the two sets of estimated parameters show the importance of taxes in influencing labour supply. The estimations are performed using two alternative procedures. The first alternative uses the probit estimation procedure to yield the participation equation parameters and derive the inverse Mill's ratio, which is then used to estimate the hours of work equation. This alternative may be affected by the endogeneity of wages to hours worked, but it is useful for comparative purpose since it generates results which are somewhat parallel to those obtained from Procedure II with selection adjustment. In the second alternative, the three step procedure was performed, using the socio-demographic variables as instruments for gross wage.

(5) *PRETXSAIV and RPRETXSAIV*: The first procedure, PRETXSAIV, estimates pre-tax hours of work equation with selectivity adjustment and instrumental variables. This regression follows the three step procedure used in the baseline estimation procedure. The purpose of instrumenting for net wage is to address the endogeneity problem as well as remove the spurious

[11] For example, in 1984 about 6 per cent of the males reported working less than 26 hours, while another 10 per cent worked over 60 hours. The equivalent proportion of women working these hours are 18 per cent and 9 per cent, respectively. The frequency of respondents working less than 25 hours per week are highest among farmers, sales workers, transport equipment operators, waitress and cleaners, and building trades. Respondents who work more than 60 hours per week tend to be working proprietors, drivers, vendors, sales and shop assistants, cooks, maids and personal services workers, fishermen and farmers (see Table 7.26).

negative relation between H_i and W_i should there be a random measurement error in H_i. The variables used to instrument for pre-tax wage are identical to those Alternative II of the baseline estimation. RPRETXSAIV follows the same estimation procedure as PRETXSAIV but is applied to the restricted sample of those working between 25-60 hours.

6.4.1 Procedure II with and without selectivity adjustments

The regression results for males and females using Procedure II (PROCII) correspond fairly closely to the three step procedure of the baseline estimations (see Table 7.15 and Table 7.16). The signs are in the same direction, although the coefficients for net wage and virtual income for both years and sexes are slightly lower than BASE1 estimates but higher than BASE2 estimates. The elasticity estimates for both sexes are given in Table 7.17 and Table 7.18. The PROCII elasticities have the same signs as the baseline elasticities. The value of the elasticity estimates of Procedure II fall between the values of the two alternatives of the baseline estimates. In 1984 the male elasticities for the uncompensated wage effect under PROCII is -0.139, compared with -0.157 under BASE1 and -0.059 under BASE2. The PROCII elasticity estimates for females are, however, closer to the elasticities obtained under BASEII than BASEI. The income elasticities are very small and not significantly different from zero at the 5 per cent level. Since the compensated wage elasticity is calculated as a residual, where the income elasticity is close to zero the compensated wage elasticity will be very close to the value of the uncompensated wage elasticity.

The next set of regressions are performed using Procedure II with selectivity adjustment (PROCIISA). The difference in estimates obtained from PROCII and PROCIISA can be attributed to the effect of selection bias. The inclusion of the selectivity adjustment has the effect of increasing the absolute value of the LWAGETAX coefficient, with the estimates for females showing much greater difference than the males. Given the very high male participation of 97.5 per cent compared with barely 40 per cent for females, the correction for self-selection is considerably more important for the females than the males.

TABLE 7.15 SUMMARY OF REGRESSION RESULTS FROM ALTERNATIVE ASSUMPTIONS FOR MALES

Hours of Work Equation

	1984		*1992*	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
BASE1				
LWAGETAX	-7.2022	0.2414	-5.7055	0.2223
YVIR	0.1615	0.0324	0.0237	0.0085
BASE2				
LWAGETAX	-2.6884	0.5714	-2.4618	0.5720
YVIR	* 0.0239	0.0338	* 0.0102	0.0086
PROCII				
LWAGETAX	-6.5175	0.2171	-5.7116	0.2044
YVIR	* 0.0575	0.0299	* 0.0142	0.0082
PROCSA				
LWAGETAX	-7.4766	0.2387	-6.2453	0.2200
YVIR	0.0939	0.0314	0.0194	0.0085
RESHR1				
LWAGETAX	-2.7414	0.1639	-1.8633	0.1502
YVIR	0.0619	0.0199	* 0.0081	0.0053
RESHR2				
LWAGETAX	-1.1814	0.3882	-1.6713	0.5087
YVIR	0.0430	0.0198	0.0050	0.0052
PRETXSA				
LWAGE	-6.7270	0.2213	-5.8653	0.2073
NLAB	0.1215	0.0256	0.0255	0.0083
PRETXSAIV				
LWAGE	-2.2912	0.5689	-2.4024	0.5670
NLAB	* -0.0311	0.0267	* 0.0045	0.0085
RPRETXSAIV				
LWAGE	-1.0584	0.3975	-1.6816	0.5103
NLAB	* 0.0165	0.0159	* 0.0036	0.0051

Notes: 1. Statistics are significant at the 5 percent level unless marked with an asterisk (*).
2. Besides the wage and non-labour income variables, the models include the following regressors: teachers (TEACH), sales workers (SALE), service workers (SER), agricultural workers (AGRI), production workers (PROD), and lamda.
BASE1 = Baseline Alt.1; BASE2 = Baseline Alt.2; PROCII = Procedure II; PROCIISA = Procedure II with Selectivity; RESHR1 = Restricted Hours Alt. 1; RESHR2 = Restricted Hours Alt. 2; PRETXSA = Pretax With Selectivity; PRETXSAIV = Pretax With Selectivity and Instrumental Variables; RPRETXSAIV = Restricted Hours and Pretax With Selectivity and Instrumental Variables.

TABLE 7.16 SUMMARY OF REGRESSION RESULTS FROM ALTERNATIVE ASSUMPTIONS FOR FEMALES

Hours of Work Equation

	1984		*1992*	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
BASE1				
LWAGETAX	-6.0942	0.5807	-3.8500	0.3969
YVIR	0.0968	0.0201	* 0.0013	0.0030
BASE2				
LWAGETAX	* -1.0258	1.7210	* -1.1878	1.2800
YVIR	0.0540	0.0217	* 0.0002	0.0030
PROCII				
LWAGETAX	-4.3240	0.3629	-2.7966	0.2980
YVIR	0.0710	0.0191	0.0011	0.0029
PROCIISA				
LWAGETAX	-7.0472	0.5533	-4.5626	0.3857
YVIR	0.0911	0.0198	* 0.0011	0.0030
RESHR1				
LWAGETAX	-2.0715	0.3741	-1.259	0.2494
YVIR	0.0350	0.0111	* 0.0013	0.0016
RESHR2				
LWAGETAX	-2.0887	0.9575	-1.7172	0.7653
YVIR	0.0280	0.1157	*0.0009	0.0017
PRETXSA				
LWAGE	-4.3918	0.3631	-2.9194	0.3004
NLAB	0.0740	0.0179	* 0.0018	0.0030
PRETXSAIV				
LWAGE	* -0.6071	1.4840	* -0.7546	1.0570
NLAB	0.0439	0.0199	* 0.0023	0.0030
RPRETXSAIV				
LWAGE	-1.9705	0.9559	-1.4390	0.7070
NLAB	0.0238	0.0105	* 0.0010	0.0016

Notes:
1. Statistics are significant at the 5 percent level unless marked with an asterisk (*).
2. Besides wage and non-labour income variables, the models include the following regressors: children up to 1 year old (CH1), children at age 2 years (CH2), children between the ages of 3-5 years (CH3_5), teachers (TEACH), sales workers (SALE), service workers (SER), agricultural workers (AGRI), production workers (PROD), and lamda.

TABLE 7.17 SUMMARY OF ELASTICITY ESTIMATES FROM ALTERNATIVE ASSUMPTIONS FOR MALES

	Uncompensated Wage Elasticity	*Compensated Wage Elasticity*	*Income Elasticity*
BASE1			
1984	-0.157	-0.167	0.010
1992	-0.120	-0.120	0.000
BASE2			
1984	-0.059	-0.058	* 0.001
1992	-0.052	-0.052	* 0.000
PROCII			
1984	-0.139	-0.142	* 0.003
1992	-0.117	-0.118	* 0.001
PROCIISA			
1984	-0.164	-0.170	0.006
1992	-0.132	-0.134	0.002
RESHR1			
1984	-0.060	-0.064	0.004
1992	-0.039	-0.040	* 0.001
RESHR2			
1984	-0.025	-0.028	0.003
1992	-0.035	-0.035	0.000
PRETXSA			
1984	-0.147	-0.155	0.008
1992	-0.124	-0.126	0.002
PRETXSAIV			
1984	-0.050	-0.048	* -0.002
1992	-0.050	-0.050	* 0.000
RPRETXSAIV			
1984	-0.023	-0.024	* 0.001
1992	-0.035	-0.035	* 0.000

Note: Associated statistics are significant at the 5 percent level unless marked with an asterisk (*).

TABLE 7.18 SUMMARY OF ELASTICITY ESTIMATES FROM ALTERNATIVE ASSUMPTIONS FOR FEMALES

	Uncompensated Wage Elasticity	*Compensated Wage Elasticity*	*Income Elasticity*
BASE1			
1984	-0.384	-0.455	0.071
1992	-0.228	-0.229	* 0.001
BASE2			
1984	* 0.064	* 0.025	0.039
1992	* -0.070	* -0.070	0.000
PROCII			
1984	-0.105	-0.105	0.000
1992	-0.065	-0.065	0.000
PROCIISA			
1984	-0.444	-0.511	0.066
1992	-0.269	-0.270	* 0.001
RESHR1			
1984	-0.131	-0.156	0.025
1992	-0.074	-0.075	* 0.001
RESHR2			
1984	-0.131	-0.151	0.020
1992	-0.101	-0.101	* 0.000
PRETXSA			
1984	-0.277	-0.378	0.101
1992	-0.172	-0.173	* 0.001
PRETXSAIV			
1984	-0.038	0.098	0.060
1992	* -0.044	* -0.044	* 0.000
RPRETXSAIV			
1984	-0.124	-0.141	0.017
1992	-0.084	-0.084	* 0.000

Note: Associated statistics are significant at the 5 percent level unless marked with an asterisk (*).

The difference in the size of coefficients generated by PROCIISA and the baseline estimates provide an indication on the effect of the two alternative instrumental variables on the estimates. The LWAGETAX coefficient estimates using instrumental variable adjustment under Alternative 1 are fairly close to the PROCIISA estimates compared with those obtained from Alternative 2, which are much lower in absolute terms. This can be expected given the very high correlation between LWAGETAX and the instruments in Alternative 1 compared to a much lower correlation between LWAGETAX and the instruments in Alternative 2.

6.4.2 Restricting to 25-60 hours per week

In the estimation of the labour supply equation, restricting the sample of workers to those working between 25-60 hours per week produces some interesting results. This procedure was done to remove those who are underemployed or those for whom it is difficult to estimate the hours worked because of the nature of their occupation or work performed during the survey week. The issue of extreme values in the hours worked as reported by the respondent is closely linked to the problem of hours misreporting which causes a spurious negative relationship between hours and wages. Between the two alternative instrumental variables used in the baseline estimations, Alternative 2 is probably much better in getting around the problem of measurement error than Alternative 1 which uses gross wage rate and gross wage rate squared as part of its instruments. Although the argument behind Alternative 1 instrumental variables is that the level of gross wage rate is quite independent of the hours worked by an individual taxpayer, yet the gross wage rate is not completely free from the effects of measurement error.

The labour supply equations with restricted hours are estimated after adjusting for selectivity and applying the two alternative instrumental variables. Two features emerge from the estimates. First, the difference in the coefficients between RESHR1 and RESHR2 is much smaller than those obtained from BASE1 and BASE2. Second, the coefficient estimates for the restricted hours are much closer to BASE2 rather than BASE1 estimates. In fact, one is tempted to say that the restricted hours estimates seem to converge towards the BASE2 estimates, although the estimates obtained from the former procedure are in some cases lower.

6.4.3 Pre-tax estimations and effect of taxes on labour supply

In the pre-tax estimations, we instrument for log wage which is considered to be endogenous to hours worked. The instrumental variables used are equivalent to Alternative 2 of log net wage equation which use socio-demographic variables as instruments. This instrument was tested for exogeneity using the following simultaneous equation model:

$$y_1^* = \beta_1'\boldsymbol{x}_1 + \gamma y_2 + \varepsilon_1 \quad \text{(Tobit)}$$

$$y_2 = \pi_2'\boldsymbol{x}_2 + \varepsilon_2$$

where x_1 is a vector of control variables, y_2 is the instrumented variable, and ε_1 and ε_2 are stochastic disturbance terms. Exogeneity of y_2 can be tested by a simple t-test of the hypothesis that $\psi = \sigma_{12}/\sigma_2^2 = 0$. The Tobit models are jointly estimated with the model for y_2. In the exogeneity tests for log wage using the instrumental variables, the coefficients for ψ obtained for males in 1984 and 1992 and females in 1984 are highly insignificant and no different from zero (see Table 7.19). Hence, the hypotheses that there are no simultaneity for the instrumented variables cannot be rejected at the 5 per cent level.

By comparing the estimations before tax with those obtained after tax, we derive the magnitude of change in hours worked that are linked with the introduction of taxes. The comparison is performed on three sets of estimates that are methodologically equivalent. First, we compare PRETXSA with PROCIISA which had been adjusted for selectivity but not endogeneity. The notable difference occurs for the log-wage coefficient, while the change for virtual income coefficient is marginal. These regressions show that with taxes the labour supply for males change marginally by -0.7 hours per week in 1984 and -0.4 hours per week in 1992. The equivalent change for females are -3.6 hours per week in 1984 and 0.4 hours per week in 1992. In other words, the uncompensated wage effect of a RM1 wage change in 1984 gives rise to a change of 4 minutes per week for the males and 10 minutes per week change for the females.

TABLE 7.19 EXOGENEITY TESTS FOR INSTRUMENTAL VARIABLES

(Before Taxes)

	1984			1992		
Variables	*Coefficient*	*Std. Error*	*Prob.*	*Coefficient*	*Std. Error*	*Prob.*
Male						
σ_{12}/σ_2^2	-0.0351	0.5825	0.9519	-0.00147	0.5803	0.9980
Female						
σ_{12}/σ_2^2	-2.1790	2.4380	0.3741	-2.9530	1.4610	0.0461

Next, we compare the estimates for BASE2 and PRETXSAIV, which have incorporated selectivity adjustment and instrumental variables. There is very little or no change at all in the hours of work per week with the introduction of taxes. The difference in the log-wage coefficient for the males were -0.4 in 1984 and 0 in 1992, while the change for the females were -0.6 in 1984 and 0.4 in 1992. The magnitude of changes in terms of hours worked per week is negligible for both sexes. In other words, following a wage increase of RM1 in 1984, the difference in wage effect between the pre- and post-tax estimations is only 4 minutes per week for the males and 9 minutes per week for the females.

For the third level of comparison, we consider effect of taxes on those working between 25-60 hours, that is, RESHR2 and RPRETXSAIV. The magnitude of the change in hours per week for is practically zero for males and females. To conclude, the three comparisons show that despite applying different assumptions to the estimation procedures, the influence of taxes on the estimate of labour supply function parameters appears to have marginal or negligible effect.

7. REGRESSION BY SUBGROUPS

After estimating the parameters for the male and female labour supply equations for the whole sample as well as restricted hours under a variety of assumptions, we extend our estimation exercise to subgroups based on occupational categories and educational attainment, as well as for workers who are employees or under self employment.

Instrumental variables are used for LWAGETAX and YVIR. The instruments used for LWAGETAX follows the Alternative I formulation. In the earlier estimations, the hours of work equations generally show negative elasticities for the uncompensated as well as compensated wage effect. The elasticities for the income effect are positive. We wish to examine how far these signs apply if the regressions are based on the sample of subgroups. Are there particular subgroups in the Malaysian labour force where the signs of significant coefficients for LWAGETAX and YVIR are reversed and be more in line with the wage and income effects of the standard labour supply model?

7.1 Occupation

As shown in Table 7.20 and Table 7.21, the coefficients of LWAGETAX for males and females are negative. In addition, the absolute values of the coefficients are larger in 1984 than 1992, with the exception of male workers in services and agricultural occupations and female workers in professional and technical occupations. The coefficient for female administrative and managerial workers may be smaller in 1984, but it is not statistically significant. The pattern where the coefficients for 1984 are larger in absolute values than those for 1992 is also evident in the earlier regressions.

To examine the effect of the change in net wage on hours worked, we compute the uncompensated wage effect ($\delta H_i/\delta W_i$) and income effect ($\delta H_i/\delta V_i$) for the two years. The hours equation is written as

$$H_i = a_0 + a_1 \ln \hat{W}_i + a_2 \hat{V}_i + a_3' Z_i + a_4 \lambda + \varepsilon_i \qquad (31)$$

where H_i is the ith person's hours of work, $\hat{W}_i$ is the predicted wage rate, $\hat{V}_i$ is the predicted virtual income, $\boldsymbol{Z}_i$ is a vector of additional control variables (such as age, experience, education, age and number of children, occupation, and strata), and ε_i is the stochastic disturbance term. From the Slutsky equation, the uncompensated wage effect and the substitution effect can be estimated in the following way:

$$\text{Uncompensated wage effect} = \delta H_i/\delta W_i = a_1/W_i \qquad (32)$$

$$\text{Income effect} = \delta H_i/\delta V_i = a_2 \qquad (33)$$

TABLE 7.20 MALE WAGE AND VIRTUAL INCOME COEFFICIENTS BY OCCUPATIONAL GROUPS, 1984 AND 1992

	1984		*1992*	
	Coefficient	*Std.Error*	*Coefficient*	*Std.Error*
Professional and Technical				
LWAGETAX	-6.1084	0.8347	-1.8806	0.6490
YVIR	0.1694	0.0599	*0.0015	0.0065
Administrative and Managerial				
LWAGETAX	-5.1256	0.9534	-4.0108	0.7306
YVIR	0.0587	0.0462	* -0.0232	0.0330
Clerical				
LWAGETAX	-8.4638	0.6162	-6.4189	0.6291
YVIR	* -0.4999	0.0634	* 0.0023	0.0401
Sales				
LWAGETAX	-7.7851	0.8780	-5.9279	0.7596
YVIR	* -0.0180	0.1016	0.0188	0.0363
Services				
LWAGETAX	-12.9410	0.8738	-14.450	0.9612
YVIR	* -0.2534	0.1552	* 0.0880	0.1047
Agricultural				
LWAGETAX	-7.9314	0.5930	-9.2371	0.5664
YVIR	0.4781	0.1976	* 0.1590	0.1384
Production				
LWAGETAX	-9.8491	0.4826	-6.4985	0.4058
YVIR	* 0.1357	0.0901	* 0.0455	0.0517

***Notes*:**

1. Statistics are significant at the 5 percent level unless marked with an asterisk (*).
2. The basic specification includes the following regressors: log wage after tax (LWAGETAX), virtual income (YVIR), and dummies for primary, lower secondary, upper secondary, and tertiary education.

TABLE 7.21 FEMALE WAGE AND VIRTUAL INCOME COEFFICIENTS BY OCCUPATIONAL GROUPS, 1984 AND 1992

	1984		*1992*	
	Coefficient	*Std.Error*	*Coefficient*	*Std.Error*
Professional and Technical				
LWAGETAX	-6.1406	1.5550	-6.3139	1.2700
YVIR	* 0.1644	0.0522	* 0.0059	0.0304
Administrative and Managerial				
LWAGETAX	* -1.5820	1.0350	-2.2120	0.8662
YVIR	* 0.0382	0.0491	* 0.0155	0.0183
Clerical				
LWAGETAX	-4.0120	0.6842	-3.8329	0.4889
YVIR	* 0.0201	0.0127	0.03594	0.0163
Sales				
LWAGETAX	-8.1354	2.1860	-6.6643	1.2950
YVIR	* 0.1064	0.0694	* 0.0007	0.0043
Services				
LWAGETAX	-14.6750	1.9890	-7.9656	1.3220
YVIR	* 0.2006	0.1179	0.2597	0.0716
Agricultural				
LWAGETAX	-7.4246	1.4110	-4.8054	1.3490
YVIR	* -0.1330	0.1330	* 0.1214	0.1107
Production				
LWAGETAX	-3.7145	1.4240	-2.1554	1.0070
YVIR	* 0.0947	0.1275	* 0.0418	0.0613

Notes:

1. Statistics are significant at the 5 percent level unless marked with an asterisk (*).
2. The basic specification includes the following regressors: log wage after tax (LWAGETAX), virtual income (YVIR), and dummies for primary, lower secondary, upper secondary, and tertiary education.

In the discussion that follows, we will merely be examining the uncompensated wage effect by occupation and education which area shown in Table 7.22 and Table 7.25 because the income effect is less interesting because they are generally insignificant. In 1984, the uncompensated wage effects are strongest for males who are engaged in agriculture (-2.7), production (-2.8) and services (-3.3), while they are weakest for males who were administrative and managerial workers (-0.3) and professional and technical workers (-0.5). The calculated mean net wage rates for males are lowest for service workers (RM3.80), agricultural workers (RM2.90) and production workers (RM3.40) and highest for managerial and administrative workers (RM15.70) as well as professional and technical workers (RM11.80). This implies that workers in agriculture, production, and services occupations, which have much lower mean wage, increase their hours of work much more in response to a reduction in wage compared with males in the administrative, managerial, professional and technical occupations, who enjoy higher wage rates.

Among the females, the negative uncompensated wage effects are strongest among occupations with the lowest paying jobs as well. In 1984, the uncompensated wage effects are strongest for female workers in sales (-7.0), services (-10.6) and agriculture (-12.3) and weakest for females in administrative and managerial occupations (-0.17). The calculated mean net wage was RM9.20 per hour for female administrative and managerial workers in 1984 compared with less than RM1.30 per hour in sales, services and agricultural occupations.

The uncompensated wage effects for 1992 for both sexes are below the 1984 position, implying that changes in net wage in 1992 have a smaller effect on hours supplied compared with 1984. The only exception to the decline is males in agriculture which saw a slight increase in the uncompensated wage effect. The most dramatic decline are recorded by females in sales, services and agricultural occupations where the uncompensated wage effect in 1992 are less than half their values in 1984.

TABLE 7.22 UNCOMPENSATED WAGE EFFECT BY OCCUPATIONAL GROUPS, 1984 AND 1992

	Males		*Females*	
	1984	*1992*	*1984*	*1992*
Professional and Technical	-0.51	-0.15	-1.19	-0.85
Administrative and Managerial	-0.32	-0.21	* -0.17	-0.17
Clerical	-1.53	-1.09	-1.01	-0.62
Sales	-1.70	-1.09	-7.00	-3.39
Services	-3.34	-3.29	-10.65	-4.30
Agricultural	-2.74	-3.08	-12.34	-6.33
Production	-2.83	-1.65	-2.23	-1.04

Note: Statistics are significant at the 5 percent level unless marked with an asterisk (*).

7.2 Education

A similar hours of work estimation procedure was conducted for workers categorised by levels of educational attainment. The wage and virtual income coefficients for males and females are given in Table 7.23 and Table 7.24. The uncompensated wage effect in absolute terms decreases with increasing level of education (see Table 7.25). In 1984, the uncompensated wage effect for males was -3.92 for those without education compared with -0.39 with tertiary education. The range for females was larger, from -15.82 without education to -0.82 with tertiary education. As with the analyses for occupations, the uncompensated wage effect is larger for those with lower wage rates and the effect declines as wage rates increases. For every educational category the uncompensated wage effect is smaller in 1992 than it was in 1984.

TABLE 7.23 MALE WAGE AND VIRTUAL INCOME COEFFICIENTS BY EDUCATIONAL LEVELS, 1984 AND 1992

	1984		*1992*	
	Coefficient	*Std.Error*	*Coefficient*	*Std.Error*
No Education				
LWAGETAX	-8.8134	1.134	-9.3667	1.046
YVIR	* 0.3518	0.4180	* 0.1300	0.2309
Primary				
LWAGETAX	-9.4496	0.4176	-8.5072	0.4362
YVIR	* 0.0195	0.0903	* 0.0494	0.0332
Lower Secondary				
LWAGETAX	-9.8723	0.6290	-7.0836	0.5335
YVIR	* -0.0955	0.0939	* 0.0939	0.0594
Upper Secondary				
LWAGETAX	-7.4668	0.5289	-5.9865	0.4919
YVIR	0.1028	0.0477	* 0.0260	0.0376
Tertiary				
LWAGETAX	-5.8173	0.6842	-2.8017	0.4609
YVIR	0.0787	0.0396	* 0.0052	0.0069

Notes:

1. Statistics are significant at the 5 percent level unless marked with an asterisk (*).
2. The basic specification includes the following regressors: log wage after tax (LWAGETAX), virtual income (YVIR), age, and dummies for sales, service, agricultural and production occupations. The regressions for upper secondary and tertiary education include a dummy for teachers.

TABLE 7.24 FEMALE WAGE AND VIRTUAL INCOME COEFFICIENTS BY EDUCATIONAL LEVELS, 1984 AND 1992

	1984		1992	
	Coefficient	*Std.Error*	*Coefficient*	*Std.Error*
No Education				
LWAGETAX	-12.0330	1.6170	-7.6736	1.6660
YVIR	* -0.0075	0.1068	* -0.0106	0.0995
Primary				
LWAGETAX	-8.3178	1.1320	-4.6290	0.9104
YVIR	0.1395	0.0681	* -0.0003	0.0034
Lower Secondary				
LWAGETAX	-6.2955	1.6610	-7.0262	1.0240
YVIR	* 0.1083	0.0867	0.1182	0.0429
Upper Secondary				
LWAGETAX	-4.7986	0.8438	-4.7372	0.6790
YVIR	0.0798	0.0243	* 0.0340	0.0267
Tertiary				
LWAGETAX	-7.8619	0.8565	-4.0090	0.5519
YVIR	0.0424	0.0141	0.0327	0.0159

Notes: 1. Statistics are significant at the 5 percent level unless marked with an asterisk (*).
2. The basic specification includes the following regressors: LWAGETAX, YVIR, AGE or EXPRC, SALE, SER, AGRI, PROD, USEC, TER, TEACH.

TABLE 7.25 UNCOMPENSATED WAGE EFFECT BY EDUCATIONAL LEVELS, 1984 AND 1992

	Male		Female	
	1984	*1992*	*1984*	*1992*
No Education	-3.92	-3.62	-15.82	-8.37
Primary	-2.87	-2.50	-6.87	-3.37
Lower Secondary	-2.46	-1.59	-2.69	-2.58
Upper Secondary	-1.13	-0.93	-1.22	-0.99
Tertiary	-0.39	-0.20	-0.82	-0.37

Notes: 1. Statistics are significant at the 5 percent level unless marked with an asterisk (*).
2. The basic specification includes the following regressors: LWAGETAX, YVIR, AGE or EXPRC, SALE, SERV, AGRI, PROD, USEC, TER, and TEACH.

7.3 Employee and Self-Employed

The final set of hours of work equations were estimated for employee as well as for the self-employed and unpaid family workers using the three stage estimation procedure. The purpose of the exercise was to ascertain if this subgrouping of workers would make a difference to the signs in the coefficients. Although the magnitude of coefficients are generally greater for the self-employed and unpaid family workers than for employees, as Table 7.26 indicates the signs for LWAGETAX and YVIR remain similar to the results obtained from earlier estimations, and the uncompensated as well as the compensated wage elasticities are negative.

8. DISCUSSION

In the preceding sections, we performed some baseline estimations using the second generation Procedure VIII three stage approach for married male and female heads of households within the 20-54 years age group. In addition, we carried out four categories of alternative estimations, namely, (a) hours of work without instrumental variables, (b) three stage estimation for those working between 25-60 hours a week, (c) pre-tax hours of work, and (d) regressions by occupation, education and employment categories. In these estimations, two major features emerge. First, taxes are found to have very weak effects for the hours of work equation. This finding corresponds with other studies such as Koster (1967), MaCurdy, Green and Paarsch (1990), and Mroz (1987). Therefore, the decision to treat labour supply as exogenous in Chapter 5 for the tax reform simulations can be supported by the findings in this chapter.

Second, the uncompensated and the compensated wage effect estimates are found to be negative while the income effect estimates are positive for all estimates where the coefficients obtained are significant. These signs seem to be contrary to what is normally expected in the formal labour supply theory which states that the income effect is negative and the wage effect is positive. This need not necessarily be the case in empirical work though.

TABLE 7.26 WAGE AND VIRTUAL INCOME COEFFICIENTS FOR EMPLOYEES AND SELF EMPLOYED, 1984 AND 1992

Employees

	1984		*1992*	
	Coefficient	*Std.Error*	*Coefficient*	*Std.Error*
Males Alt.1				
LWAGETAX	-7.5671	0.3631	-5.0923	0.3347
YVIR	0.1388	0.0406	* 0.0148	0.0104
Males Alt. 2				
LWAGETAX	-1.8998	0.6325	-1.8493	0.6751
YVIR	* 0.0165	0.0311	* 0.0050	0.0085
Females Alt. 1				
LWAGETAX	-6.8467	0.7080	-3.9238	0.5188
YVIR	0.0929	0.0212	0.0682	0.0165
Females Alt. 2				
LWAGETAX	* -1.5257	1.3630	* -1.4188	1.2140
YVIR	0.0381	0.0188	* 0.0270	0.0153

Self Employed and Unpaid Family Workers

	1984		*1992*	
	Coefficient	*Std.Error*	*Coefficient*	*Std.Error*
Males Alt.1				
LWAGETAX	-7.6527	0.5820	-8.8869	0.5310
YVIR	* -0.0928	0.1163	-0.2305	0.0996
Males Alt. 2				
LWAGETAX	* -5.8745	3.247	-6.7690	2.9050
YVIR	* 0.0224	0.1179	* -0.1387	0.1019
Females Alt. 1				
LWAGETAX	-9.0140	1.2490	-8.6090	0.9206
YVIR	0.1098	0.0533	* -0.7165	0.0038
Females Alt. 2				
LWAGETAX	* 2.3890	9.7720	-16.1980	-2.2930
YVIR	0.1416	0.0553	* -0.7114	0.0039

Notes:

1. Statistics are significant at the 5 percent level unless marked with an asterisk (*).
2. The coefficients are derived using the baseline estimation procedures and variables.

There are three aspects to our discussion. First, we cite other studies with similar results. Second, we explore some reasons why the results seem reasonable in the Malaysian context, and finally, we discuss the limitations of data and model specification that could affect the regression results.

8.1 Studies With Similar Results

In some of the earlier studies in the United States based on data from the 1960 Census of Population and the 1967 Survey of Economic Opportunity, there are some evidence on the negatively-sloped labour supply curve. The slope of the male hours of work function was found to be more negative when the calculated wage rate was used than when an alternative wage rate variable, such as an instrumented wage rate was constructed (Bloch, 1973; DaVanzo, DeTray and Greenberg, 1973; Masters and Garfinkel, 1977; Borjas, 1980). Even after efforts were made to remove spurious correlation from the wage variable, most studies found a negative uncompensated own-wage elasticity of hours of work at sample means. Pencavel (1986) points out that the uncompensated wage elasticities for males can range between -0.15 and -0.09 for DaVanzo, DeTray and Greenberg (1973), -0.110 for Masters and Garfinkel (1977) and -0.156 for Ashenfelter and Heckman (1973). However, because of the strong negative income effect, in many cases the estimated compensated wage elasticities in these studies are positive. Evidently, this is not the case for Malaysia because from our estimations, the income effect is found to be either very low or insignificant.

As for non-wage income, it is generally recognised that this variable is difficult to measure accurately. The different procedures used generate distinctly different estimates of the effect of non-wage income on hours of work. Pencavel (1986: 63) argues that only 16 of the 57 different coefficients presented in DaVanzo, DeTray and Greenberg's study are statistically significant, and of these 16 estimates, exactly one-half is positive and one-half is negative. Since the estimates on non-wage incomes vary so much and the uncompensated wage effect is typically estimated to be negative, it is not unusual for the substitution effect to be negative.

Among the more recent studies using the instrumental variables approach, Mroz (1987) initially obtained a negative uncompensated wage elasticity by using the OLS but which turns positive after he introduced instrumental variables for logged wage. In his estimate of taxes in the single worker model, the coefficients obtained for logged wage are negative for all the six specifications. As for non-wife income, the coefficients are negative for four of the specifications and positive when the labour market experience of females are used as instruments. The changing of signs are attributed to the different exogeneity assumptions used in the alternative specifications. In another study, Flood and MaCurdy (1992) obtained negative wage effect and positive income effect in one of their specifications but they attribute it to the endogeneity of the gross wage and income variables (and these variables squared) which are used as instruments for net wage. Blomquist (1996: 387) raised some doubts on this issue and argued that although it is difficult to test whether the gross wage rate and nonlabour income are admissible instruments, in his Monte Carlo simulations of hours of work for small samples, the instrumental variables using background variables show serious bias, especially in small samples, compared with those using gross wage rate and non-labour income.

In our study, we have tried to address some of the concerns about endogeneity of net wage as well as measurement error of hours. While the absolute value of the coefficients for logged wage vary with the alternative specifications, the negative signs remain. Given the very small, and often insignificant, positive income effect, this implies that the substitution or the compensated wage effect (which is calculated as a residual) is negative.

8.2 Are the Results Supportable?

One can raise the question whether the signs obtained from the Malaysian data set seem reasonable given the socio-economic and institutional setting of Malaysia. A scatterplot analysis of hours of work by log net wage for males and females in 1984 is shown in Figure 7.14 and Figure 7.15. The charts show that there is a much wider spread of hours worked at lower wages than at higher wages. The line of best fit shows a negative relationship in both the cases.

FIGURE 7.14 PLOT OF HOURS OF WORK
AND NET WAGES FOR MALES, 1984

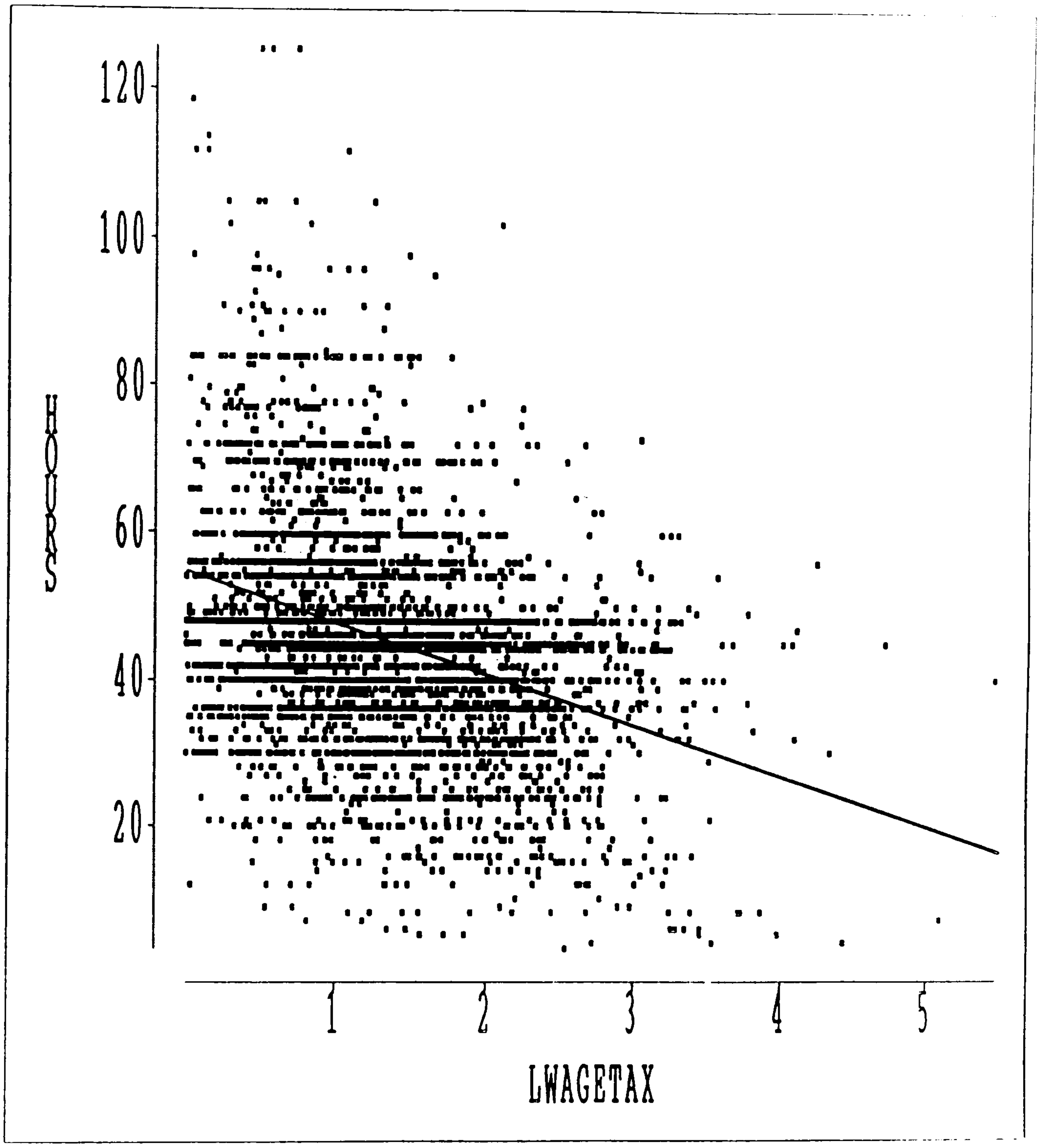


FIGURE 7.15 PLOT OF HOURS OF WORK AND NET WAGES FOR FEMALES, 1984

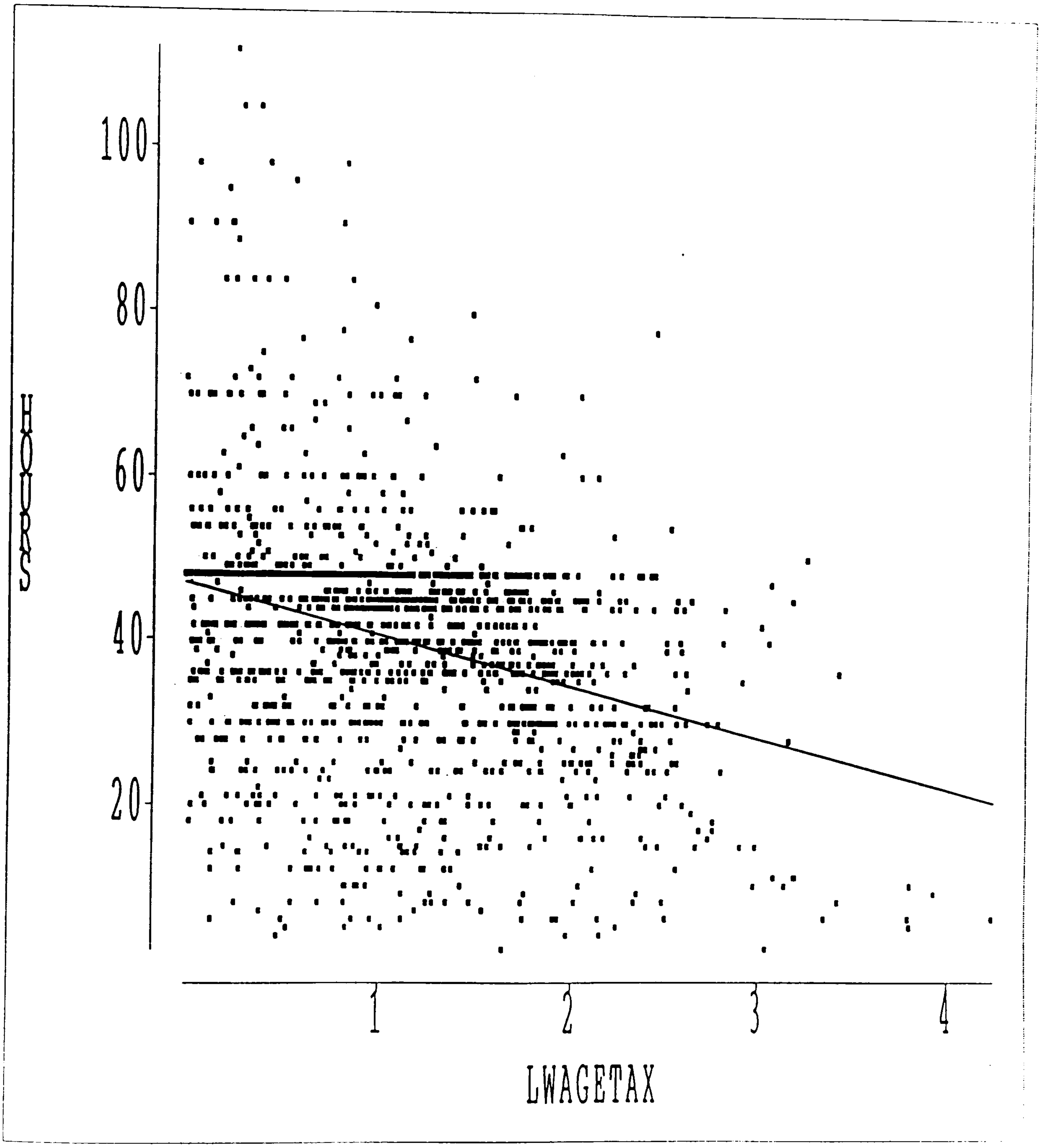


TABLE 7.27 MEAN AND STANDARD DEVIATION OF HOURS WORKED BY WAGE LEVEL

Wagetax	*Male*				*Female*			
	1984		*1992*		*1984*		*1992*	
RM	*Mean*	*Std.Dev*	*Mean*	*Std.Dev.*	*Mean*	*Std.Dev*	*Mean*	*Std.Dev*
Below 2	47.3	22.1	48.0	24.6	12.0	21.7	11.2	21.1
2.00-3.99	48.6	12.6	49.7	12.9	40.9	13.0	43.5	13.2
4.00-5.99	44.6	11.5	47.0	10.6	38.5	11.6	42.9	11.3
6.00-9.99	40.3	11.7	44.7	12.1	34.2	11.5	38.2	10.5
10.00-19.99	37.2	12.7	42.9	12.4	29.7	12.5	35.7	11.1
20.00-49.99	37.1	16.3	44.2	9.16	21.1	17.2	37.8	11.5
Above 50.00	36.1	15.0	41.9	15.7	7.5*	2.1	26.0*	25.5

Note: * Only two cases at this wage level

The pattern is analytically clearer in Table 7.27, which shows the mean and standard deviation of hours worked by wage level.[12] It is clear from the table that both males and females work longer hours in 1992 than in 1984, especially for males who earn wages of RM6 and above and females who earn RM4 and above. This can be explained by the Malaysian economic context. In 1984 the economy, which was facing high unemployment, was at the start of a recession which peaked two years later. With the fall in demand, there was redundant labour and some manufacturing companies went as far as implementing voluntary reduction of work hours among the production workers in order to reduce the number of staff retrenchment. The economic situation in 1992 was quite a reverse. Since 1988 the economy had been growing rapidly at rates well above 8 per cent per annum, and by 1992, not only did the country reached full employment, but there were reports of labour shortage in several sectors of the economy. Workers put in more hours of work to meet the demand from the economic boom.

The second feature is that the mean hours worked are highest for those earning the lowest wages, and the mean hours worked become successively lower as the wage level increases. In the case of males, there was a difference of 13-16 mean hours between the highest and lowest wage categories. This is a clear indication of the backward bending labour supply curve. In addition, the standard deviation is largest for those in the lowest wage category. This means that there is a wider spread of hours worked for those earning below RM2 per hour than in the other wage categories. Workers in the lowest wage category of less than RM2 include those are underemployed (below 30 hours per week), who are likely to be casual or part-time workers, and those who work very long hours exceeding 60 hours per week. While many other studies show that the male labour supply curve is slightly backward bending, the female schedule is found to be strongly

[12] It should be noted that this table has not controlled for the effect of non-labour income on hours of work, which after all is very small.

TABLE 7.28 WORKING MORE THAN 60 HOURS PER WEEK

Male	%	*Female*	%
Working proprietors	18.3	Cooks, maids, and personal services	24.0
Motor vehicle drivers	17.5	Sales and shop assistants	22.8
Vendors	14.1	Vendors	8.9
Security services	11.4	Working proprietors	18.8
Fishermen	9.0	Farmers	11.4
Others	29.7	Others	14.1
Total	100.0	Total	100.0

Source: Labour Force Survey, 1984 Total number: Males = 724 Females = 372

positively sloped. In this respect, the results in our regressions coincide with the findings of Nakamura and Nakamura (1981) who show that the uncompensated wage elasticities for females hours of work are negative. However, unlike Nakamura and Nakamura, our results show that female wage and income elasticities, though small, are still larger than those for the males.

While workers would undoubtedly be motivated to put in more hours if they are offered higher wages in Malaysia, as is the case elsewhere, what could be the explanation of worker with lower wages putting in more hours per week? Firstly, the long hours of work occur mostly among the self-employed and unpaid family workers, casual workers, or those engaged in the informal sector activities. Workers in the formal sector would be bound by institutional working hours. In many cases, it is the nature of job which involves long working hours or requires a lot of waiting time since the completion of the task is dependent on the input of others. Table 7.28 shows the frequency of some of the occupations where individuals work over 60 hours in 1984. Many of them are also the low paying jobs. Working proprietors, sales and shop assistants, cooks and vendors work long hours because shops and stalls in Malaysia operate for much longer hours than, say, in Britain. Shops, stalls, and street vendors selling food maintain activities seven days a week. Motor vehicle drivers spend much of their time on the road, as well as making deliveries, waiting for the loading and unloading of goods, or merely waiting for their services to be demanded. Maids and servants often live with their employers where their services would be provided during throughout the day. Fishermen who are out to sea would include the hours spent away from shore as their working hours. These workers are not paid on the hourly basis but on a monthly salary and/or on the number of tasks performed. In view of the long working hours and low earnings associated with these occupations, the calculated earnings per hour of the individuals in these occupations would be very low.

Secondly, those with low wages and non-labour income will have to increase their hours of work in order to reach an income level that can meet their household consumption. Participation is typically high in a society without an unemployment benefit system since the option of either working for low wages or to remain unemployed and receive some benefit, is not open to individuals. The social norm dictates that all able-bodied adult males are expected to work and cannot depend on family ties for financial support beyond a certain length of time, unless under exceptional circumstances. Without a comprehensive income support programme which would raise family income to a certain subsistence level, it appears that those in the lower wage categories would maximise their hours of work, if there is a opportunity to do so, in order to reach their 'target' household income to meet their family financial obligations. Workers in these wage category tend to be those with little or no education and often work in occupations with little job security. They are largely self employed or engaged in 'informal' sector activities. The added worker effect is also more evident among families with low income. As discussed in Section 6.1.2, women with low family income have a higher likelihood of participation. These women are engaged in part-time work, while still performing their household duties, in order to supplement their husbands' income.

Those with higher wages tend to be better educated and have better job security. In addition, their hours of work tend to be institutionally determined. Government employees work between 8 a.m. to 4.15 p.m. on a five and the half working week, while office workers in the private sector work between 9 a.m. to 5 p.m. on a five day week with shorter lunch hours. Workers on the highest wage rates have greater flexibility in their working time, which is reflected in the larger standard deviation in their hours of work. This could also mean that there are some workers earning high wage rates who work shorter hours as well as long hours. In view of the hours of work pattern described, it is not surprising in the Malaysian labour market to encounter a backward bending curve which starts from the very lowest income levels, rather than the higher income levels as described in formal microeconomic theory.

The assumption that leisure is a normal good, that is, higher income is related with increased demand for leisure and negatively related with hours of work, does not appear to be supported by the regression results. In any case, after controlling for net wages, the effect of non-labour income on hours of work is either very small or statistically insignificant. In the baseline regressions, the income elasticities for the males are practically zero except for Alternative 1 in 1984. For the females, there is a small positive income elasticities for 1984 and zero for 1992. There is a positive relationship, albeit small, between non-labour income and hours of work. One reason for this could be that individuals in the prime working groups are be keen to build up their wealth position for retirement.

In the developed countries where the unemployed workers are paid a lump-sum unemployment benefit, one of the issues to be investigated is whether the size of the benefit is large enough for individuals to choose non-participation in preference to participation since they would reach a higher utility level from voluntary unemployment. The choice of the two alternatives would depend on the individual's marginal rate of substitution between income and leisure relative to the wage rate. Another line of enquiry is the case of a negative income tax which has been criticised by economists for its negative effect on work incentives. The effect of government transfer programmes introduce non-convexities in the budget line which could give rise to multiple tangencies and small changes in the wage or tax parameters can lead to large changes in desired hours of work. In addition, where movements between marginal tax brackets have significant tax implications, there is an issue of the clustering of individuals around the kinks on the budget line as a result of controlling their hours of work. To address this clustering, analysts introduce the optimisation error in their model specification on the argument that individuals cannot fine-tune their hours of work precisely.

These issues, though interesting and relevant in the developed countries context, are unimportant for countries, such as Malaysia. The first two issues are irrelevant because of the absence of unemployment benefit or negative income tax programmes. Regarding the third issue, there is little reason to believe that the number of individuals who try to locate at the kinks are significant enough to warrant attention. The proportion of taxpayers among those who work are small. Those who pay income taxes are in relatively low tax brackets, where the median tax bracket in 1992 was 12 per cent for both sexes. For the average taxpayer, it might not appear to be worth the trouble to limit the hours of work. The primary concern is really to raise their total income rather than to remain in a lower tax category by limiting hours of work. Furthermore, there is little scope for them to vary the hours of work in order to locate at the kink because the bulk of the income taxpayers are employees in the formal sector where the hours of work are institutionally determined. Among those who are engaged in business or are self employed, there must be other effective avenues of tax planning permitted under the Income Tax Act rather than limiting their hours of work. For the reasons above, we do not introduce the optimisation error in our model.

8.3 Model Specification and Data Limitations

In this chapter, we use the standard utility function to develop the models for participation, wages, and hours of work for heads of households. The regression analyses yield elasticity estimates for Malaysia, which could be compared to results of studies conducted elsewhere. One issue that could be raised is whether the standard utility function used for the model is flexible enough to accommodate the concept of households requiring at least a minimum income level to meet their consumption needs, which may be regarded as the fixed cost. For societies that do not have income support programmes, household members would have to work long hours or take up part-time work to supplement their household income in order to reach at least a 'target income' level to cover the fixed cost. This may require a reformulation of the utility function to capture the backward sloping supply curve of labour for households with low marginal wage rates.

One alternative formulation that could accommodate the backward bending labour supply curve is given in Blundell (1980), which we summarise below. The utility function of each household h is given by a strictly convex utility function,

$$U[x_{1h}/m_{1h}, x_{2h}/m_{2h}, \ldots, x_{rh}/m_{rh}] \tag{34}$$

where x_{ih} is the quantity of good i consumed, and each deflator m_{ih} measures the corresponding specific effect on utility of household composition. Let p_i denote the price of good i and y_h the income of household h, the cost function is given by

$$c_h(\boldsymbol{p}, U_h) = c_h(p_1 m_{1h}, p_2 m_{2h}, \ldots, p_r m_{rh}, U_h) \tag{35}$$

where $a_h(p)$ and $b(p)$ are concave, linear homogeneous functions in p. In the model, the fixed cost $a_h(p)$ depend on household composition and a Cobb-Douglas is chosen for $b(p)$ in order to lead to the linear expenditure system. If there is a single male worker in each family facing a marginal wage rate w and a linear budget constraint

$$p'x + wl = wT + y' = y \tag{36}$$

where l is leisure time, T is the maximum time available, y is full income and y' is non-labour income. Labour supply is given by $T - 1 = h$. As suggested by Muellbauer (1980), the cost function in the form of equation (35) is as follows

$$c_h\,(w_h, p, U_h) = a_h(p) + w_h d(p) + b(p)^{1-\theta} w_h^{\theta} U_h \tag{37}$$

where $0 < \theta < 1$ and $d(p)$ is homogenous of degree zero in prices. To simplify, Blundell specifies that

$$d(p) = \gamma_l \prod_i p_i^{\partial i}, \qquad \sum_i \partial_i = 0, \qquad \gamma_l > 0$$

$$b(p) = \prod_i p_i^{\beta_i}, \qquad \sum_i \beta_i = 1$$

Taking derivatives of c_h with respect to price, the expenditure equations for all i are as follows:

$$p_i x_{ih} = p_i \gamma_i m_{ih} + \gamma_l \delta_i w_h + (1-\theta)\beta_i (y'_h + (T - d(p))w_h - a_h(p)) \tag{38}$$

The labour supply equation corresponding to equation (38) is given by

$$h = \frac{\theta}{w}(a(p) - y') + (1-\theta)(T - d(p)) \tag{39}$$

which has the property of being backward sloping for $y' < a(p)$. In other words, the labour supply curve is backward sloping when the non-labour income is less than the fixed cost. In the sample of households in his study, Blundell found that this condition is typically satisfied.

The second issue is that the static labour supply model does not take into account life cycle considerations.[13] In a life cycle model, an individual can decide on the number of hours to supply to the market and the intensity of market participation can vary with age. Given his long-run values of wealth and his wage, he must decide on the optimal timing of hours and consumption, which vary over the life cycle. Therefore, there is a difficulty with regard to the standard practice in empirical labour supply studies of using an aggregate of all current period non-earnings income to estimate pure income effects. However, the available data do not permit any attempt to separate out these life-cycle considers to obtain wealth elasticities.

The data source is also not rich enough to capture the ideal theoretical concepts that could be used to measure pure income effects. The problem of estimating the income slopes in empirical work is evident in other studies in the developed countries as well. As noted by Smith (1980: 166), 'The estimated income slopes were disappointing because the income variable either had the wrong sign (positive), implying that leisure was an inferior good, or it was sufficiently small so that compensated own-wage slopes in the labor supply equation remained negative.' Among the reasons to explain these failures are the severe under-reporting of the income variable that leads to biased income coefficients and data on assets and liabilities are unavailable. That fact that reported property income constitutes a very small component (about 1 per cent) of the average

[13] Card (1991) surveys the large literature regarding the allocation of working time over the life cycle. Most of the studies focus on estimating annual hours of work equations and use panel data sets. Wages include both current and future values. The majority of the available empirical evidence suggests a weak or even non-existent wage responsiveness of labour supply over the life cycle.

Malaysian household income indicates that there might be substantial under-reporting on this income source in the Household Income Survey. As a proposal, some effort could be made in Malaysia to collect better quality data on wage, hours of work, and non-wage income of households.

9. CONCLUSION

In this chapter, we attempt to estimate the hours of work equation with taxation for Malaysia using the combined data from the Labour Force Survey and the Household Income Survey collected by the Department of Statistics. Much of our understanding of post-tax labour supply functions are based on studies conducted in the developed countries, and very little empirical work has been done in developing countries. One of the most recent studies using a developing country data is conducted by Rochjadi and Leuthold for Indonesia. However, in using the CES direct utility function which constrains the income effect to be negative, they produced compensated wage elasticity estimates that are generally in conformity with the results obtained by many studies conducted in the developed countries. Other than the fact that it was the Indonesian data set that was analysed, there are no additional insights to be gained on the labour supply response from a developing country that does not have the welfare and benefit system of the developed countries.

To avoid any preconceived notions on the shape of the labour supply curve, we use the 2SLS instrumental variable approach with selectivity adjustment in our estimations. There are three stages in the estimation process. In the first stage, we estimated the participation equation parameters. For the males, the participation likelihood is unimodal and an increasing function of non-labour income. Two alternative sets of instrumental variable estimators are used: the first uses gross wage and non-labour income as instruments, while the second relaxes the exogeneity assumption and uses socio-demographic variables as instruments. The estimated uncompensated wage elasticities for the males range from -0.12 (1984) to -0.16 (1992) under BASE1 and -0.05 under BASE2. For the females, the uncompensated wage elasticities under BASE1 are -0.38 for 1984 and -0.23 for 1992, while they are insignificant under BASE2. The income elasticities estimated under BASE1 for 1984 are 0.01 for males and 0.07 for females, while the income elasticities for 1992 are insignificant for both sexes. Using the Smith and Blundell maximum likelihood procedure to test for simultaneity, the results show that there is no problem of simultaneity for both the alternative instrumental variables.

For comparative purpose, we perform some estimations using a different set of assumptions to ascertain the effects of selectivity adjustment, instrumental variables, restricted hours, and pre-tax wage and income variables on the results obtained in the baseline procedures. The inclusion of selectivity adjustment in the estimation procedure increases the absolute values of the LWAGETAX coefficient, with greater difference in absolute values for the female estimates. Given the much lower female participation, the correction for self-selection has greater effect on the uncompensated wage elasticity for the females than the males. Another alternative is to limit the estimations to those working between 25-60 hours per week since the extreme values in hours worked may be linked with hours misreporting which causes a spurious negative relationship between hours and wages. The coefficients for LWAGETAX and YVIR turn out to be smaller than those obtained under BASE1 and come close to BASE2 estimates.

Some estimations are performed for pre-tax labour supply equation and the results are compared with the post-tax labour supply equation. Comparison between the estimates from PRETXSAIV and BASE2, both of which have incorporated selectivity adjustments and instrumental variables, shows that there is very little or no change at all in the hours of work per week with the introduction of taxes. The magnitude of changes in terms of hours worked per week with the introduction of taxes is negligible for both sexes. The comparison is extended to those working between 25-60 hours per week and is found to be practically zero for males and females. From these estimates, the influence of taxes on the labour supply seem to be of second order or negligible effect. It appears that the decision to treat labour supply as exogenous in the CGE model in Chapter 5 is not an unreasonable assumption.

The final set of estimations are performed for occupation and educational subgroups, as well for employees and self employed/own account workers. The income effect is found to be statistically insignificant for most cases. The uncompensated wage effect are strongest for workers in the agricultural, production and services occupations, while they are weakest for administrative and managerial workers, as well as professional and technical workers. The results show that in response to a positive change in wage, the occupations with lower mean wage would reduce more hours of work than those occupations with higher mean wage. The regressions by educational subgroups show that the uncompensated wage effect is inversely related to the level of education. Regarding the final set of regressions, the coefficients for LWAGETAX and YVIR are generally larger for the self-employed and unpaid family workers than for employees. For all the regression alternatives performed in this chapter, the estimated uncompensated wage effects are found to be negative and significant, while the income effects are positive and are very small or statistically insignificant. There has been no subgroup where the signs of significant coefficients for the wage and income effects are reversed.

This chapter found that the male and female labour supply curves for Malaysia are backward bending, starting from the lowest wage and income levels. This raises two issues. First, this phenomenon could have been brought about by the absence of a comprehensive welfare and benefit system normally associated with a welfare state. Workers earning low wages would have to put in more hours in order to have an adequate amount of income or 'target income' to meet their household expenditure. These workers are also those who are either self-employed or engaged in informal sector activities in which the hours of work per week can vary widely. Workers who are on higher wage levels tend to be engaged in formal occupations which are bound by institutionally determined working hours, which are generally lower than those engaged in the low wage jobs. Second, there is the problem of separating out the pure income effects, particularly for workers at the higher income levels. In earlier studies conducted elsewhere, the negative income effect is large enough to give rise to a positive compensated wage elasticities. In the case of Malaysia, the under-reporting of the non-earnings income and asset ownership could be partly responsible for the negligible income effects and the phenomenon of the backward-bending labour supply curves.

Chapter 8

SUMMARY AND CONCLUSION

1. INTRODUCTION

The purpose of this thesis has been to examine the implications of reforming the tax system of a developing country, using Malaysia as the case in our study. Accordingly, we briefly assessed the theoretical and empirical literature on tax reform, with special reference to the experiences of developing countries, and examined the transformation of Malaysia's fiscal and tax policies during the last 25 years. Since the analysis of a tax reform requires the identification of improvements over the current position, we performed a detailed analysis of the economic and tax structures of the status quo.

Next, we analysed the effects of reforming Malaysia's tax system. First, we performed simulations of tax reform at the macroeconomic level using the computable general equilibrium model. In our simulations, we were interested to investigate which tax instruments could be used to enhance revenue at least cost to the macroeconomy and households, and how could the current tax structure be improved within a revenue-neutral context. Second, we used micro econometric techniques to examine the effect of taxation on Malaysia's labour supply. The question under consideration was what effect would income tax have on participation and labour supply.

We now summarise briefly the findings from our study, followed by some suggestions on areas for further research.

2. TAX REFORM IN DEVELOPING COUNTRIES

Chapter 2 examines the goals of tax reform and the experiences of developing countries that have undertaken tax reforms in recent years. Some of the goals of a tax reform are revenue generation; promotion of growth, saving and investment; achievement of equity and efficiency; and improvement of tax administration and tax compliance. Many developing countries have undertaken tax reforms in recent years. Some themes and lessons that emerged from the variety of tax reforms are as follows:

1. Raising tax revenue is often the key objective of a tax reform, although in the short term, the reform can be designed to be revenue neutral.

2. Some studies found that countries with lower taxes exhibit higher rates of growth, although the tax levels for all countries are rising in recent years. Studies to examine the effectiveness of incentives to encourage investments are still inconclusive, partly because of conceptual difficulties and data inadequacies.

3. Under the equity goal, agencies such as the World Bank argue that user charges is an equitable as well as an efficient way to fund public expenditure. The other approach is the 'ability to pay' principle, in which people with equal capacity should pay the same and people with greater ability should pay more. For a more equitable tax system, a growing number of tax economists have advocated the shifting from income to consumption taxation. There is growing scepticism on the efficacy of the progressive tax structure to bring about income redistribution because of poor tax coverage and arbitrary enforcement in developing countries. Instead of designing a progressive tax structure to achieve greater equity, the strategy has now shifted to using taxes to raise revenue, which is then used for distributive spending.

4. The design of an efficient tax system is often linked to the concepts of optimal commodity and optimal income taxation in theoretical tax literature. In practice, many recent tax reforms focused on achieving broader-based taxation at more uniform rates on the grounds that lower marginal tax rates reduce the distortions induced by high tax rates (Thirsk, 1991).

5. Tax reform proposals must consider the institutional features and tax administration of each country. An important aspect often overlooked in tax reforms is the improvement of tax administration and tax compliance. It is important to keep the system as simple as possible for effective

implementation, especially for developing countries, which lack trained administrative personnel and resources as well as accounting sophistication of taxpayers.

6. The tax reforms undertaken by many developing countries vary in scope, context, substance, and timing. The reforms can be comprehensive or partial, designed to raise revenue or to be revenue neutral, and their timing can be contemporaneous, phased or successive.

7. The base of existing taxes should be broadened to enhance revenue. VAT is the preferred instrument for revenue enhancement, tax neutrality, vertical equity, and improving the collection of other taxes.

8. Since the provision of special tax preferences often drains the national treasury, the potential gains of these preferences should be weighted against the potential losses in efficiency and revenue. The taxation of multinationals should be examined in terms of the tax regime of their home country, tax havens and conduit countries, and transfer pricing practices.

3. ECONOMIC TRANSFORMATION AND FISCAL REFORM

In Chapter 3, we examined the evolution of Malaysia's economy and the transformation of its fiscal policies during the last twenty five years. We analysed Malaysia's economic transformation in terms of four phases: (1) high economic growth and adoption of the New Economic Policy (1970-79); (2) economic boom with growing macro imbalances (1980-84); (3) policy reorientation and recession (1985-86); and (4) recovery and rapid growth (1987-95).

At the start of the seventies, Malaysia's rapid economic growth was accompanied by an equally fast expansion of direct and indirect taxes, which provided the resources for the expansion in public sector programmes. From 29 percent in 1970, the share of public expenditure to GNP grew to 50 percent in 1980, with largest expenditure going to education, defence, infrastructure, agriculture and rural development. Physical and social infrastructure programmes were given priority to improve the life of the people and create the environment for economic growth and employment creation. During 1980-83, the economy faced declining terms of trade, reduced export demand, and falling commodity prices. Anticipating a turnaround in the OECD economies, the government adopted a counter-cyclical fiscal policy and increased borrowing, which resulted in further deterioration of the budgetary deficit and foreign debt.

In 1984, the policy of fiscal expansion was reversed. The government initiated expenditure cutback and rescheduling of projects, although programmes under the New Economic Policy were spared. The reduction in public expenditure coincided with the price collapse of Malaysia's major exports, and the economy sank into recession in 1985-86. Despite economic difficulties, the fiscal discipline policy stance was maintained throughout the recession, without resorting to prime pumping the economy. Operating expenditure was kept within one-quarter the size of GNP and allocations for development programmes were mainly directed towards social services, transport and communications. The government adopted further measures of fiscal policy reform, such as reducing the size and role of the public sector, better management and utilisation of public resources, greater economic liberalisation and deregulation of industry, and privatisation of public enterprises and utilities. At the same time, tax rates were reduced and increased tax exemptions, allowances and incentives were given to the private sector to promote investment.

The period after 1987 was a phase of rapid economic growth with low inflation. Following economic recovery, public development programmes were reinstated, but the share of public expenditure to GNP was kept on a reducing trend. Private investment grew rapidly in response to the improved business environment and excellent growth prospects. The policy reorientation in the mid-1980s had a profound impact on Malaysia's economic management. Many of the fiscal and tax policies adopted since 1984 continued to be applied into the nineties. In 1991 Malaysia adopted the Second Outline Perspective Plan and Vision 2020. These development policies have the following implications on the direction of future fiscal policies.

1. Fiscal policies that promote efficiency, reduce price distortions, and have less negative impact on the poor would be adopted.

2. Public expenditure would be directed towards the areas offering the highest economic and social payoffs and the tax revenue would be raised with minimal costs to the economy.
3. The government would have to place more emphasis on monitoring and regulating the standards of privatised services.
4. There is a need to reform the tax system to establish a broad-based, equitable and neutral tax system.

4. STRUCTURE AND TREND OF THE TAX SYSTEM

After the discussion on economic transformation and fiscal reform, we then proceeded to examine the characteristics and trend of the tax system in Chapter 4. The Malaysian tax system was fairly productive in tax revenue and kept up with public expenditure requirements for most of the years under review. In 1990, tax revenue amounted to 20 percent of GDP and 64 percent of total expenditure. The tax buoyancy estimates showed that during 1970-95 a growth of one percent in GDP was accompanied by 1.1 percent growth in total tax revenue. In terms of the ratio of tax revenue to GNP, Malaysia collected more taxes than the other countries in the region.

There were two broad trends in the tax system.

1. The main source of tax revenue had shifted from indirect taxes to direct taxes during the last twenty five years.
2. The tax policy reforms undertaken in the mid-eighties had the effect of reducing the revenue contribution of some of the taxes.

The changes in the tax rates since the mid-1980s are as follows:

1. The top marginal tax rate for personal income tax was reduced from 55 percent to 32 percent, while the lowest marginal tax rate was reduced from 6 percent to 3 percent.
2. Corporate tax rate fell from 50 percent to 30 percent, while the investment incentives were expanded.

3. For petroleum, the Second Generation Production Sharing Contracts were adopted to provide more favourable terms to the contractor.

4. In the 1991 Budget, export duties on rubber, pepper and all minerals were abolished.

5. The import duties for consumer products were also abolished or reduced in stages.

Despite these rates reduction, they did not lead to public finance difficulties because the rapid economic growth after 1988 generated the required tax revenue, while the restrained public sector spending reduced the need for a rapid growth in tax revenue. However, there are several indications that a tax reform is needed to set in place a broad-based, equitable and neutral tax system, which facilitates tax administration and compliance, and generates revenue without creating distortions in the economy.

Some findings from the analysis of *personal income tax* are as follows:

1. There were 1.2 million taxpayers for personal income tax in 1990, of whom two-thirds were employees and one-third were sole-proprietors and partners. Furthermore, 54 percent of the taxpayers came from the lowest tax category and contributed only 8 percent of the income tax revenue. There could be efficiency gain in exempting those from the lowest tax categories and concentrating the efforts of the Department of the Inland Revenue on the 'hard-to-tax' group.

2. The comparison of Malaysia's marginal tax rates with neighbouring countries showed that Malaysian taxpayers faced the highest marginal tax rates in 1984 and the highest tax brackets were reached very quickly.

3. The comparison of Malaysia's marginal tax rates across time showed that the tax net in 1995 was wider than 1984. One reason for this is the problem of 'bracket creep' where rising prices pushed income earners into higher tax categories over time.

4. Individuals also reached the highest tax bracket faster in 1995 than a decade before. The progressivity in personal income tax had also increased for those

in the middle-income category, but remained unchanged for those in the top-income category.

The marginal effective tax rates of the *corporate sector* were found to be significantly lower than the statutory rates. While the incentives might have the effect of attracting foreign investments to the country, they also contributed to an erosion of the tax base as well as biasing projects towards more capital-intensive techniques. There is potential for reducing or removing some of the incentives to make the tax system more efficient and less distortionary.

The *sales tax* is an *ad valorem* single stage tax imposed at the import and manufacturing levels. The 'ring system', which allowed licensed firms to purchase and import tax-free all the inputs, was adopted to prevent tax cascading. In recent budgets, the *service tax* had been widened to include a wider range of services. The sales tax provides a wide scope for tax evasion, and is complex and difficult to administer. In addition, the ratio of goods and service tax to total revenue in Malaysia was lower than other countries within a similar income band. Despite the rapid growth of commercial activities and private consumption, the growth of sales and service taxes has been lacklustre. The adoption of VAT has the potential of modernising the tax system, broadening the tax base, and providing the government with an indirect tax handle to raise revenue with more fiscal neutrality and less economic distortions.

The thesis performed tax buoyancy estimates and drew some of the following implications from them.

1. The buoyancy estimates showed that an increase in GDP by 1 percent would be accompanied with an increase of 1.3 percent for direct taxes and 0.9 percent for indirect taxes. The low buoyancy of indirect taxes was the outcome of tax rate reductions and the declining importance of primary exports in the economy. In a tax reform, attention should be given to redress the low productivity of indirect taxes in revenue generation.
2. The buoyancy coefficients for export duties and import duties were 0.05 and 0.8, respectively. Since 1980, the contribution of export duties rapidly dwindled from 20 percent of tax revenue to a mere 2 percent in 1995. Duties

on many of the imports had been removed or reduced. One way to compensate for the decline of trade taxes and increase the tax productivity of indirect taxes is to adopt the value added tax.

3. The buoyancy of petroleum tax was estimated at 1.2. Petroleum tax provided the tax revenue base for the eighties. In view of the fluctuating oil price and production quotas, the tax reform in Malaysia should shift the tax burden to income and consumption taxes.

4. The relatively low buoyancy of corporate tax of 1.0, despite the rapid growth in economy and the corporate sector, only serves to show that the wide range of tax exemption and incentives for the manufacturing sector had dampened revenue expansion more than was generally realised.

5. MALAYSIAN TAX REFORM SIMULATIONS

After gaining an insight into the economic performance, fiscal policy, and tax structure in Malaysia during the last twenty five years, we used the computable general equilibrium (CGE) model in Chapter 5 to examine the effects of Malaysian tax reform on some key economic variables. They are real GDP aggregates, aggregate price movements, real wages, and real household aggregates. The counterfactual simulations addressed two questions: Which category of taxes would be the best instruments for raising 10 percent government revenue with minimal costs to the selected indicators? Could there be some efficiency gains from reforming the structure of direct and indirect taxes in a revenue-neutral tax context?

To perform the analysis, the Malaysian CGE model was first calibrated on the Malaysian National Accounts and key variables, including tax revenue and public expenditure, from published data for 1990-95. In establishing the sectoral growth rates and macroeconomic framework for the period, we were guided by the Malaysian Second Outline Perspective Plan for 1991-2000. We then performed seven revenue-enhancing tax reform simulations and two revenue-neutral tax reform simulations for 1990-99, and compared the results against the baseline simulation.

The simulation results and their policy implications are as follows:

1. Corporate tax, which in our simulation includes the contribution from petroleum tax, would be the best instrument to raise revenue without hurting households or negatively affecting GDP aggregates. In fact, the simulation shows that the effect of raising corporate tax on the two aggregates can be positive.

2. If the revenue increase was to be derived from more than one tax source, then a good strategy would be raising revenue through the combination of corporate tax and non-commodity tax with VAT (VAT10). Income tax can also be used for revenue generation since it does not have a negative effect on real GDP; however, it does have the disadvantage of reducing real household disposable income and private consumption.

3. It is possible to raise revenue from these three sources without the need to levy a large increase in their tax rates. For instance, one percent of government revenue in 1990 can be raised from a single tax source by increasing corporate tax by 3.5 percent, VAT10 by 6.6 percent, or income tax by 8.2 percent.

4. The revenue-neutral tax reform simulations showed that current tax structure can be improved and made more efficient. This could be realised by at least two reform options: (a) reducing personal income tax and increasing corporate tax, and (b) adopting VAT to replace the current sales and service taxes. Both these tax reform options would bring an improvement to the household income, consumption and savings. The adoption of VAT would also improve the levels of GDP and raise real wages for the workers.

5. The MIER Tax Reform Group (1988) and Bardai (1993) proposed that the reduction of the Malaysian income tax rate and the adoption of VAT. Our simulations supported the two proposals, since they would be favourable to the selected indicators. We agreed with Bardai that corporate tax should not be reduced. Our simulations showed that the increase in corporate tax was not expected to bring negative effects for real household and GDP aggregates; on the contrary, it is expected to be beneficial for the economy. Some of the

actions to increase corporate tax revenue include rationalising the generous tax incentives offered to corporations.

6. The shift from the sales and service taxes to VAT was expected to bring improvements to real household aggregates, as well as real GDP and private consumption. The simulation showed a slight effect in stimulating international trade, with some gain in net exports. The adoption of VAT in Malaysia was not foreseen to bring inflation. The GDP price deflator would rise by 2 percent throughout the decade, which suggests that there would be a once and for all shift in prices, without the acceleration of price changes.

6. LITERATURE REVIEW ON LABOUR SUPPLY WITH TAXATION

In considering a tax reform, a fundamental question is whether changes in taxes have an impact, if at all, on the individual's response towards participation and labour supply. Chapter 6 and Chapter 7 took up the analysis of estimating the parameters of labour supply with taxation at the micro level. Chapter 6 discussed the theoretical and empirical aspects of parameter estimation. The first generation research on labour supply encountered problems of how to treat missing wages for non-workers, model misspecification, and sample selection bias. The second generation research paid more attention to model specifications and estimation issues, although the results obtained from the improved procedures still showed the wide range of elasticity estimates that characterised first generation work.

The parameter estimation of labour supply with taxation is further complicated by the non-linear budget set. In the case of a progressive tax system, the budget set is convex and piecewise-linear. With low income welfare programmes, the budget set is no longer strictly convex and multiple tangencies can result. The difficulty of estimating the labour supply parameters is finding the point of tangency on a curved budget set. Although many different functional forms have been adopted by various analysts, the two predominant approaches in the literature for labour supply with progressive taxation are: (a) piecewise-linear budget constraint approach or the Hausman method, and (b) instrumental variable method. For both approaches, virtual income is used as a device to overcome the difficulty of finding the maximum on a convex budget set.

The Hausman method provides an elegant solution to the estimation of labour supply coefficients. It takes into account the linear segments and kinks on the after-tax budget set and admits randomness in hours of work arising from measurement error and variation in individual preference. The problem with this method is that it assumes perfect knowledge on the part of the analyst and the individual with respect to the entire budget constraint. Heckman (1983) argued that this procedure does not produce consistent estimates and may be less robust than the instrumental variable estimation procedure. Flood and MaCurdy (1992) used both approaches on the Swedish cross-section data and concluded that the instrumental-variable procedure offered a robust method for estimating the coefficients of the labour supply function. The instrumental variable approach overcomes the problems of endogeneity of the right-hand side variables as well as reverse causality. After considering methodological issues, the chapter discussed the empirical findings from studies on labour supply with taxation conducted in the developed and developing countries.

7. MODELLING LABOUR SUPPLY WITH TAXATION

Chapter 7 drew upon the experience of second generation work and used the instrumental variable approach to assess the importance of taxes in Malaysia's labour supply function. The analysis was based on the combined data from the Labour Force Survey and the Household Income Survey collected by the Department of Statistics, Malaysia.

There were three stages in the estimation procedure:

1. *Participation Equation.* The parameters of the participation function were estimated by using the standard probit likelihood function on both workers and non-workers. This estimation gave a measure of λ so that it could be used to estimate the parameters of the wage equation in the next stage via selection bias-corrected regression. The variables used in the regression equation were experience (for males), age (for females), non-labour income, education attainment, strata, and age of children (for females).

2. *Wage Equation.* In instrumenting for wage, two sets of variables were used. For the first alternative, the variables used were wage, non-labour income,

experience or age, and λ to adjust for selection bias. The second alternative relaxed the exogeneity assumption for the instrumental variable estimators by excluding gross wage and non-labour income. Socio-demographic variables, such as experience or age, education, occupation, and λ were used. Gross wage and non-labour income were used to instrument for virtual income. The tests for exogeneity showed that both sets of alternative instrumental variables for net wage and virtual income were valid instruments.

3. *Hours of Work Equation.* The variables used to estimate this equation include the instrument for wage rate, virtual income, and a vector of additional control variables, such as age or experience, education, age and number of children, occupation, strata, and λ.

The baseline estimations on hours of work for both males and females was performed for the whole sample of married couples within the 20-54 years age group. Next, four alternative estimations were performed to determine the extent to which the results differed from the baseline estimations. The four categories of alternative estimations were: (a) hours of work without instrumental variables, (b) three stage estimation for those working between 25-60 hours a week, (c) pre-tax hours of work estimation, and (d) regressions by subgroups of occupation, education and employment category.

The estimations yielded two main conclusions.

1. Taxes were found to have a weak effect on labour supply response. Comparison between the effects on labour supply of wages before and after taxes showed that the magnitude of changes in hours worked per week was negligible for both sexes. The wage effect of RM1 in 1984 was only 4 minutes per week for the males and 9 minutes per week for the females. This finding corresponds with other studies such as Koster (1967), MaCurdy, Green and Paarsch (1990), and Mroz (1987).

2. The uncompensated and the compensated wage effect estimates were found to be negative, while the income effect estimates were positive for all estimates where the coefficients obtained were significant. These signs seemed to be

contrary to what is normally expected in formal labour supply theory where the wage effect is positive and the income effect is negative.

There were some previous studies which also found a negative uncompensated wage elasticity of hours of work, even after efforts to remove spurious correlation from the wage variable. Since some of these studies estimated a strong negative income effect, this resulted in the estimated compensated wage elasticities becoming positive. This was not the case for Malaysia because the income effect was found to be either very low or insignificant. It is generally recognised that non-wage income is difficult to measure. Since the estimates on non-wage incomes varied so much and the uncompensated wage effect was typically negative, it was possible for studies to show a negative substitution effect.

We argued that the results above seem reasonable given the socio-economic and institutional setting of Malaysia. In addition, there are the limitations of data and model specification that could have affected the regression results.

1. An examination of the survey data showed that there was a much wider spread of hours worked at lower wages than at higher wages. In addition, the labour supply curve in Malaysia was backward bending, starting from the lowest wage level.

2. While workers are generally expected to put in more hours if offered higher wage rates, there are some reasons why workers with lower wage in Malaysia put in more hours per week. One reason was the nature of the jobs with low wage rates which involved long working hours or required a lot of waiting time. There was also the related problem of errors in calculating the wage rates for jobs with long working hours, though the regressions on restricted hours would partly address this issue.

3. Individuals with low income would have to increase their hours of work in order to reach an income level that could meet their household consumption needs. In a society without unemployment benefit or low income support, workers would maximise their hours of work, if there is an opportunity to do so, in order to have higher income. The added worker effect is evident from

the participation equation, where women with low family income have a higher participation likelihood. On the other hand, those earning higher income tended to be better educated and worked in more secure jobs, where the working hours were often institutionally determined. Estimations by subgroups (occupation, education, and employment category) showed that the wage effect is strongest among those with least education, manual or agricultural labour, and own-account workers.

4. In developed countries, it is relevant to consider whether the size of the benefits is large enough for individuals to choose non-participation in preference to participation and whether working individuals would limit their hours of work to locate at the kinks on the non-convex budget line brought about by transfer programmes. These issues are not directly relevant for countries, such as Malaysia. First is the absence of unemployment benefit or negative income tax programmes. Second, the taxpayers are small in proportion and the majority are in relatively low tax brackets. Their primary concern is really to raise their total income even if that means paying slightly more taxes, rather than to remain in a lower tax category by limiting hours of work.

5. The assumption that leisure is a normal good, that is, higher income is related with increased demand for leisure and negatively related with hours of work, does not appear to be supported by the regression results. After controlling for net wages, the effect of non-labour income on hours of work is either very small and positive, or statistically insignificant. One reason for this could be that individuals in prime working groups are keen to build up their wealth position for retirement or as a safeguard against involuntary unemployment. In addition, females with higher levels of non-labour income (which implied that their spouses earned high salaries, often as a result of better education) have greater incentive to work because they tend to be better educated and could command higher wages. However, there are other explanations for the 'perverse' income effect.

6. The model used in the analysis was the standard utility function. This functional form may not be flexible enough to accommodate the concept of households requiring at least a minimum income level to meet their consumption needs. The second issue is that the static labour supply model does not take into account life cycle considerations of an individual's long-run values of wealth and wage and the timing of hours and consumption. Therefore, there is a difficulty with the standard practice of using current period non-earnings income to estimate pure income effects. Finally, the data source may not be rich enough to capture the ideal theoretical concepts that could be used to measure pure income effects, which could account for the estimated income slopes having 'wrong signs' in empirical work. Income surveys typically have problems with under-reporting of non-labour income.

8. AREAS FOR FUTURE RESEARCH

The thesis has brought to light some interesting findings as well as some additional areas of research which we were not able to pursue given the focus and resource constraints of our research. Below are some related topics for future research that could build on and extend the work of this research.

1. Study the impact of tax incentives on the effective tax rates faced by investors, on the composition of overall investment, and on the substitution of the factors of production. This is important for policy making since the lack of knowledge in these areas can lead to indiscriminate granting of tax incentives that erode the tax base, without promoting the desired mix of investment.

2. Examine the extent of under-reporting of income and tax evasion of personal income tax. This study should be linked to proposals on how the institutional arrangements governing tax administration and tax compliance can be strengthened in Malaysia.

3. Use the Malaysian micro-macro model to examine the impact of tax reform on income distribution among households. This would require some reprogramming of the model in order for this analysis to be possible.

4. Although this is the first attempt to estimate the Malaysian labour supply function parameters using the combined data from the Labour Force Survey and the Household Income Survey, it is felt that the estimations can be strengthened with improved data on wage rates, hours of work, and non-labour income. It would be necessary to collaborate with the Department of Statistics to collect these information in their surveys. These data would not only be useful for labour supply analytical work, but also be used for planning and policy making as well.

5. Re-estimate the labour supply function parameters using a formulation that takes into account the backward sloping supply curve of labour.

APPENDIX 1

MODEL STRUCTURE

For some insight into the model we provide a brief description of the model structure. More details about the model structure are found in Demery *et. al* (1992) and Harrigan (1996) on which the following presentation is based.

PRODUCER DECISIONS

Except for Public Services and Dwellings, the demand for all variable factors of production, including intermediate commodity inputs and different categories of labour, are obtained by maximising producer profit or minimising producer cost subject to multi-level technology constraints. A fixed coefficient technology is employed in the production of Public Services output. The net output for Dwellings is equated with imputed rent, calculated as the product of user cost of housing and the beginning of the period stock of private dwellings.

There are three layers for the multi-level technology tree in each sector. Activity gross output is modelled as a CES function of an aggregate intermediate input and value-added. The aggregate intermediate input is an aggregate of composite commodities which are Armington aggregates of domestic and imported commodities. Value-added is produced with a CES technology combining composite labour and capital, and composite labour is a CES aggregation of professional and skilled, semi-skilled and unskilled occupational categories.

Type I Problem: At all levels of the production hierarchy, other than the value-added level, the factor demand and associated price functions are derived from solving the following profit maximisation problem:

$$\max_{x,z} p.y - w.x - r.z \qquad s.t. \quad y = \{ces, cd\}(x,z)$$

where y is 'output', x and z are 'inputs', p is the price of output, w is the cost per unit of the first input, and r is the cost per unit of the second input. CES is constant elasticity of substitution production function and CD is Cobb Douglas production function. The production functions are restricted to constant returns. The production functions have the following form:

ces $\quad y = [\alpha_1.x^{\frac{\sigma-1}{\sigma}} + \alpha_2.z^{\frac{\sigma-1}{\sigma}}]^{\frac{\sigma}{\sigma-1}} \quad \sigma>0; \sigma\neq 1$

cd $\quad y = A.x^{\alpha}.z^{1-\alpha} \quad 0\leq\alpha\leq 1$

where σ is a substitution elasticity, α's are the share parameters, and A is the productivity of the available technology. Solution of the profit maximisation problems subject to CES and CD production function restrictions yields the following factor demand expressions:

fces $\quad x = \left[\frac{\alpha_1.p}{w}\right]^{\sigma}.y$ and $z = \left[\frac{\alpha_2.p}{r}\right]^{\sigma}.y$

fcd $\quad x = \alpha.\frac{p}{w}.y$ and $z = (1-\alpha).\frac{p}{r}.y$

In view of the variable factors and constant returns to scale assumed for the model, the problem above implies a constant marginal (=average) cost. In full equilibrium, the price of output is equal to marginal cost. This enables the market clearing prices to be derived directly from the representative firm's unrestricted CES and Cobb-Douglas cost functions. Substitution of the expressions for factor demands into their parent production functions yield the following expressions for price (=marginal cost):

pces $\quad p = [\alpha_1^{\sigma}.w^{1-\sigma} + \alpha_2^{\sigma}.r^{1-\sigma}]^{\frac{1}{1-\sigma}}$

pcd $\quad p = [A.\alpha.(1-\alpha)]^{-1}.w^{\alpha}.r^{1-\alpha}$

The model occasionally use the inverted forms of these unrestricted cost functions, say in the case where 'law of one price' (LOP) option in a goods market is used in the specification. The inverted CES and Cobb-Douglas cost functions are as follows:

ipces $\quad w = \left[\frac{p^{1-\sigma} - \alpha_2^{\sigma}.r^{1-\sigma}}{\alpha_1^{\sigma}}\right]^{\frac{1}{1-\sigma}}$

ipcd $$w = [A.\alpha.(1-\alpha)]^{\frac{1}{\alpha}}.r^{\frac{\alpha-1}{\alpha}}.p^{\frac{1}{\alpha}}$$

Type II Problem: M[4] applies this problem exclusively at the value-added level of the production function. The Type II problem could accommodate the possibility of imperfect competition in the goods market and the presence of adjustment costs of changing output. The structure of the problem is as follows:

$$\max_{n,p} p.y - w.n - \frac{\theta}{2}.\frac{\Delta y^2}{ly}$$

$$\text{s.t. } y = \{gces, \text{gcd}\}(n,\bar{k}); \quad y = \left[\frac{p}{p^e}\right]^{-\gamma}.x \qquad \theta \geq 0;\ 1 \leq |\gamma| \leq \infty$$

In this problem, labour, n, is the only variable input, while capital input, k, is fixed over the period of solution, ly is output (value-added) lagged one period, p^e is the price a firm expects other firms to charge, and x is a demand scale variable, and the parameter γ is the price elasticity of demand with sign reversal. In the symmetric equilibrium, $p = p^e$. The solution of Type II problem gives the following expressions for the factor demand equations:

fces $$n = \left[\frac{\lambda.\alpha_1}{w}.\left[\frac{p}{\mu} - \theta.\frac{\Delta y}{ly^2}\right]\right]^{\sigma}.y^{\frac{\lambda.\sigma-(\sigma-1)}{\lambda}}$$

fcd $$n = \frac{\lambda.\alpha_1}{w}.\left[\frac{p}{\mu} - \theta.\frac{\Delta y}{ly^2}\right].y$$

where $$\mu = \frac{1}{1-\frac{1}{\gamma}}$$

is the profit maximising mark-up of price over marginal cost. For an interior maximum for the representative firm, marginal revenue equals marginal cost, and with constant price elasticity, price is proportional to marginal revenue. Accordingly, in full equilibrium the price can be inferred by substituting the profit maximising factor demand equations back into the underlying production functions to yield the following associated (restricted) cost functions:

pgces
$$p = \mu.\left[\frac{w}{\lambda.\alpha_1}.\left[\frac{y^{\frac{\sigma-1}{\sigma\lambda}} - \alpha_2.\bar{k}^{-\frac{\sigma-1}{\sigma}}}{\alpha_1}\right].y^{\frac{\sigma-1-\lambda.\sigma}{\lambda}} + \theta.\frac{\Delta y}{ly^2}\right]$$

pgcd
$$p = \mu\left[\frac{w}{\lambda.\alpha_1}.\left[\frac{\left[\frac{y}{A}\right]^{\frac{1}{\alpha\lambda}}.\bar{k}^{-\frac{\alpha-1}{\alpha}}}{y}\right] + \theta.\frac{\Delta y}{ly^2}\right]$$

The supply schedules could be obtained by inverting the restricted cost functions:

ipgces
$$y = \left[\frac{\lambda.\alpha_1}{w}.\left[\frac{p}{\mu} - \theta.\frac{\Delta y}{y^2}\right].\left[\frac{y^{\frac{\sigma-1}{\sigma\lambda}} - \alpha_2.\bar{k}^{-\frac{\sigma-1}{\sigma}}}{\alpha_1}\right]^{\frac{\sigma}{1-\sigma}}\right]^{\frac{\sigma\lambda}{\sigma.(1-\lambda)-1}}$$

ipcd
$$y = \left[\frac{\lambda.\alpha}{w}.\left[\frac{\frac{p}{\mu} - \theta.\frac{\Delta y}{ly^2}}{\bar{k}^{\frac{\alpha}{\alpha-1}}.A^{\frac{-1}{\lambda.\alpha}}}\right]\right]^{\frac{1-\lambda\alpha}{\lambda.\alpha}}$$

The associated cost functions of the model are:

Price of imported intermediate goods	$pjm_{ji} = \overline{pxw_i} \cdot er \cdot markup$
Price of domestic intermediate goods	$pjd_{ji} = px_i \cdot markup$
Domestic commodity price	$px_i = pc\ es(pj_i, pv_i) \mid i \notin LOP$
Domestic commodity price	$px_i = \overline{pxw_i} \cdot er \mid i \in LOP$
Price of intermediate aggregate	$pj_i = pces(pjj_{ji})$
Price of value added	$pv_i = rpces(w_i, va_i, k_{i[t-1]}) \mid i \notin LOP$
Price of value added	$pv_i = ipces(pj_i, px_i) \mid i \in LOP$
Price of composite intermediate goods	$pjj_{ji} = parm(pjd_{ji}, pjm_{ji})$
Nominal wage	$w_i = pces(w_{ni})$

where *pces* is an unrestricted CES cost function; *rpces* is a restricted CES cost function; *ipces* is an inverted, unrestricted CES cost function; *parm* is an Armington price function; the index *LOP* denotes sectors where the law of one price operates; *pxw* is the exogenous world commodity price in foreign currency units; *er* is the nominal effective exchange rate; *px* is the domestic commodity price; *pv* is the price of value-added; *pj* is the price of the intermediate aggregate; *w* is the nominal wage; *va* is quantity value-added; *k* is the capital stock; *pjd* is the price of domestic intermediate commodities, and *pjm* is the price of imported intermediate commodities (both in purchaser' prices).

The last equation allows wages paid to identical labour categories in different sectors to vary. The purchasers' prices of domestic commodities sold to different uses are calculated as mark-ups on *px* in exactly the same way as *pjd*. The index *n* is used to identify different labour categories, and mark-up is used where goods or factor prices are marked-up over factor cost or their *cif* price. The time subscripts have been dropped except where lagged (beginning of the period) quantities or prices enter into the determination of a variable.

The factor demand relationships of the model are:

Aggregate intermediate input	$j_i = fces(px_i, pj_i, x_i)$
Value added	$va_i = fces(px_i, pv_i, x_i) \mid i \notin \mathrm{LOP}$
Value added	$va_i = irces(pv_i, w_i, k_{i[t-1]}) \mid i \in \mathrm{LOP}$
Composite intermediate commodities	$jj_{ji} = fces(pjj_{ji}, pj_i, j_i)$
Composite labour	$n_i = fcd(w_i, pva_i, va_i)$
Labour by skill	$nn_{ni} = fces(w_{ni}, w_i, n_i)$
Domestic output sold to intermediate uses	$jd_{ji} = arm(pjd_{ji}, pjm_{ji}, jj_{ji})$
Imported output sold to intermediate uses	$jm_{ji} = arm(pjm_{ji}, pjd_{ji}, jj_{ji})$

where *fces* is a *CES* factor demand equation; *irpces* is an inverted, restricted CES cost function, and *arm* is an Armington demand function; *px* is the domestic commodity price; *pj* is the price of the intermediate aggregate; *pjd* is the price of domestic intermediate commodities; *pjj* is the price of composite intermediate commodities; *pjm* is the price of imported intermediate commodities; *pv* is the price of value-added; *w* is nominal wage; *LOP* denotes sectors where the law of one price operates; *x* is gross output; *j* is the aggregate intermediate input; *jj* are composite intermediate commodities; *jd* is domestic output sold to intermediate uses; *jm* is imported output sold to intermediate uses; *n* is composite labour; *nn* is labour by skill; *k* is capital stock; and *va* is quantity value-added.

FACTOR AND INSTITUTIONAL INCOMES

Factor incomes are calculated as the product of factor prices (before taxes and subsidies) and the stocks of factor inputs employed, summed over all activities. Operating surplus is determined residually after subtracting gross emoluments from nominal value-added. The aggregate operating surplus of the economy is then distributed between its different institutional transactors.

Household disposable income is calculated as:

$$y_h = wage - taxes + transfers + asset\ income + unincorporated\ business\ income$$

Transfers include the unrequited transfers from overseas residents, while asset income is the product of lagged (beginning of period) stocks and lagged interest rates, so that asset income is received only after transactors have held stocks for one period. Although not shown, asset revaluations are accommodated in the calculation of all incomes.

Corporate net income is calculated as:

$$y_c = operating\ surplus + transfers + asset\ income - taxes$$

Government income is derived principally from taxes, but the government has claims on the operating surplus of those activities in which it invests. Government asset income is typically negative and represents service payments on outstanding public sector debt. The computation of taxes and transfers in M^4 is highly disaggregated. Income taxes received by government are separately calculated by transactor and indirect taxes are disaggregated by transactor and commodity end uses.

$$y_g = taxes - transfers + operating\ surplus + asset\ income$$

FINAL DEMANDS

Consumption. Aggregate household consumption expenditure is modelled as a function of household disposable income, private sector no-human wealth, and the bank deposit rate as follows:

$$c = \alpha_0 \cdot y_h^{\alpha_1} \cdot wl_{[t-1]}^{\alpha_2} \cdot \exp[-\alpha_3 . id]$$

where c is nominal consumption, wl is (beginning of the period) nominal wealth, and id is the bank deposit rate. Aggregate nominal consumption expenditure is spread over 'wants' via the linear expenditure system. A 'wants aggregation matrix' and Armington demand equations are then applied to derive domestic and imported commodity demands.

Investment. Investment demands are translated into demands for commodities via a capital aggregation matrix (***B***) and split into their domestic and imported components using Armington relationships. Private investment demand in all but land-based activity is a function of Tobin's q (q), which is defined as the ratio of the marginal revenue product of capital to its user cost, net of taxes and gross of subsidies. The demand equation used is a follows:

$$ia_i = (\partial_i + g_i . q_i^{\phi_i}).(k_{i[t-1]} . \psi_i)$$

which ensures that in the steady-state (q=1) private capital grows at the target steady-state rate, g. In this expression, δ is the physical depreciation rate in sector i; k is the capital stock; ψ is the share of private capital in the total (beginning of the period) capital stock of the sector, and q is Tobin's q. In land-based activities, investment demands, and hence capital accumulation, are determined exogenously. Exogenous investments by government and public corporations are added to private investment before the translation from activity to commodity demands. Public corporations 'target' investment demands are uniformly adjusted by the factor z (which is an endogenous variable) to satisfy the public sector debt constraint.

Exports. The demand for exports are as follows:

$$ex_i = \left(\frac{\gamma_i \cdot pex_i}{pwx_i \cdot er}\right)^{-\beta_{i0}} \cdot YW_i^{\beta_{i1}} \Big| i \notin LOP$$

$$ex_i = x_i - \sum_j jd_{ij} - cd_i - id_i - \overline{g_i} \Big| i \in LOP$$

where *pex* is the purchasers' price of exports; *pwx* is world price of the commodity; *er* is nominal effective exchange rate; and *YW* is an index of world demand for commodity *i*. In law of one price markets, exports adjust residually to clear goods markets.

Savings and Financial Surpluses. The savings of each transactor is defined as the difference between their total income from all sources (including asset income) less their current account expenditure. Savings of the household sector is:

$$s_h = y_h - c$$

and for government is

$$s_g = y_g - g$$

where c is household consumption, g is total recurrent expenditure on goods and services. Total recurrent government expenditure is largely determined through government's exogenous decisions about employment and wages in the public sector. Recurrent expenditure (in real terms) adjusts passively to accommodate the supply of output of Public Services. The financial surplus of each transactor is equal to their savings less their capital account expenditure.

Portfolio Selection. The government sets fixed growth paths for the money and bond stocks, and its residual funding needs are then satisfied through overseas borrowing. This is given by

$$fs_g + wk_g - \overline{dM} - \overline{dB} = er \cdot dfD_g^*$$

where *wk* are working capital demands by government, *dM* is the change in the money stock (currency), *dB* is the change in the market value of the bond stock, and $er.dFD^*_g$ is the change in the stock of foreign currency denominated public sector debt.

For creditor sectors, asset portfolio selection can be represented as:

$$\begin{bmatrix} D_j \\ B_j \\ E_j \\ er.FA_j^* \end{bmatrix} = \Theta \cdot \begin{bmatrix} id \\ ib \\ ie \\ \overline{iw} + \dot{er}^e \end{bmatrix} + \begin{bmatrix} \vartheta_d \\ \vartheta_b \\ \vartheta_e \\ 1 - \vartheta_m - \vartheta_b - \vartheta_e \end{bmatrix} \cdot (A_{j[t]} - wk_{j[t]})$$

where D are interest bearing deposits, B is bonds, E is equity, FA^* are net foreign assets in foreign currency units; id is the bank deposit rate; ib is the market return on bonds; ie is the return on equity; iw is the exogenous world nominal interest rate, and $\dot{er}^e$ is the expected depreciation of the effective exchange rate.

For debtor sectors, the corresponding portfolio selection equations are:

$$\begin{bmatrix} L_i \\ E_j \\ er \cdot FD_j^* \end{bmatrix} = \Pi \cdot \begin{bmatrix} il \\ ie \\ \overline{iw} + \dot{er} \end{bmatrix} + \begin{bmatrix} \varpi_l \\ \varpi_e \\ 1 - \varpi_l - \varpi_e \end{bmatrix} \cdot (A_{j[t]} + wk_{j[t]})$$

where L are loans, il is the loan rate, er is the nominal effective exchange rate, and $\dot{er}$ is the change in the exchange rate.

Material Balances. In each sector, the total output demanded equals total output supplied in each period:

$$x_j = \sum_i jd_{ji} + cd_j + id_j + ex_j + \overline{g_j} | j \notin LOP$$

where jd is intermediate demand, cd is consumption demand, id is investment demand, and g is government demand. In the market for Public Services, government recurrent expenditure on goods adjusts to satisfy material balances for given supply, and in the Dwellings market, the demand for housing is automatically equated with imputed rent.

Labour Market Closure. In all labour markets except the market for unskilled non-agricultural labour, wages (w_n) adjust to equate the demand and supply of labour in each period. In the non-land based, unskilled labour market the rate of wage change is related to expected consumption goods price inflation, excess demand for labour, and a trend capturing productivity growth. Hence in those markets that clear, the equation is given as:

$$lf_n \cdot (1 - nrue_n) = \sum_i nn_{ni}$$

where lf is the labour force and $nrue$ is the (exogenous) natural rate of unemployment. In the non-land based market for unskilled labour, we have:

$$d\ln w_n = \theta_0 + \theta_1 d\ln cpi^e - \theta_2 \ln\frac{(1 - ue_n)}{(1 - nrue_n)}$$

where ue is the actual unemployment rate and cpi is the consumer price index.

Other Intrinsic Dynamics. The capital stock in each activity is depreciated in each period and augmented by lagged investment:

$$k_{i[t]} = k_{i[t-1]} \cdot (1 - \delta) + (ia_{i[t-1]} + \overline{ia^g_{i[t-1]}} + \xi.\overline{ia^{pc}_{i[t-1]}})$$

where k is capital stock, g is government, and pc is public corporations. Private sector, non-human wealth is defined in nominal units as the value of the capital stock owned by the private sector, plus outside money plus the private sector housing stock less net foreign indebtedness (net of government debt). Technical progress occurs at the value-added level of each sector's production function and is labour augmenting (Harrod neutral), but with variable rates across activities.

Expectations of change in consumer price inflation and of the nominal exchange rate are adaptive and are of the usual form:

$$\pi_{t+1} - \pi = \lambda_\pi \cdot \left(\frac{dcpi}{cpi_{t-1}} - \pi_t\right)$$

$$\dot{er}^e_{t+1} - \dot{er}^e_t = \lambda_{er} \cdot \left(\frac{der}{er_{t-1}} - \dot{er}^e_t\right)$$

where pi is expected inflation and $\dot{er}^e$ is the expected depreciation of the exchange rate.

APPENDIX 2

MODEL SPECIFICATIONS

Labour Market			
Agricultural Workers	Mkt clearing		
Professsional and Skilled Workers	Mkt clearing		
Semi- Skilled Workers	Mkt clearing		
Unskilled Workers	Mkt clearing		

Goods Market			
Commodity	*Market*	*Mark-Up*	*Scale*
Export Agriculture	Perfect		
Other Agriculture	Perfect		
Forestry	Perfect		
Mining	Perfect		
Resource Manufacturing	Perfect		
Traded Manufacturing	Perfect		
Domestic Manufacturing	Perfect		
Private Services	Perfect		
Oil and Gas	Perfect		
Utilities	na	1.000	1.000
Construction	Perfect		
Commodity	*Quota*	*World Price*	
Export Agriculture	na	on	
Oil	on	always	
Forestry	on	on	

Asset Market	
Bond rate	variable
Lending rate	variable
Exchange rate	managed float
Debt constraint	passive

Expectations	
Exchange Rate Expectations PA Parameter	0.200
Cost of Borrowing	0.000
Inflationary Expectations	0.200

Gross Output Technology

Activity	*Technology*	*Subs. Elas*
Export Agriculture	ces	0.250
Other Agriculture	ces	0.250
Forestry	ces	0.250
Mining	ces	0.250
Resource Manufacturing	ces	0.250
Traded Manufacturing	ces	0.250
Domestic Manufacturing	ces	0.250
Private Services	ces	0.250
Oil and Gas	ces	0.250
Utilities	ces	0.250
Construction	ces	0.250

Value Added Technology

Activity	*Technology*	*P.Adj.*	*Subs. Elas*
Export Agriculture	ces	0.00	0.750
Other Agriculture	ces	0.00	0.750
Forestry	ces	0.00	0.750
Mining	ces	0.00	0.250
Resource Manufacturing	ces	0.00	0.500
Traded Manufacturing	ces	0.00	0.500
Domestic Manufacturing	ces	0.00	0.500
Private Services	ces	0.00	0.750
Oil and Gas	ces	0.00	0.250
Utilities	ces	0.00	0.250
Construction	ces	0.00	0.750

Intermediate Goods 'Technology'

Activity	*Technology*	*Subs. Elas*
Export Agriculture	ces	0.250
Other Agriculture	ces	0.250
Forestry	ces	0.250
Mining	ces	0.250
Resource Manufacturing	ces	0.250
Traded Manufacturing	ces	0.250
Domestic Manufacturing	ces	0.250
Private Services	ces	0.250
Oil and Gas	ces	0.250
Utilities	ces	0.250
Construction	ces	0.250

Composite Labour 'Technology'

Activity	*Technology*	*Subs. Elas*
Export Agriculture	ces	0.500
Other Agriculture	ces	0.500
Forestry	ces	0.500
Mining	ces	0.500
Resource Manufacturing	ces	0.250
Traded Manufacturing	ces	0.250
Domestic Manufacturing	ces	0.250
Private Services	ces	0.500
Oil and Gas	ces	0.500
Utilities	ces	0.500
Construction	ces	0.250

Technical Progress Function

Activity	*Form*	*Rate*
Export Agriculture	harrod	0.000
Other Agriculture	harrod	0.000
Forestry	harrod	0.000
Mining	harrod	0.000
Resource Manufacturing	harrod	0.000
Traded Manufacturing	harrod	0.000
Domestic Manufacturing	harrod	0.000
Private Services	harrod	0.000
Oil and Gas	harrod	0.000
Utilities	harrod	0.000
Construction	harrod	0.000

Imports - Intermediate Goods

Commodity	*Form*	*Price Elas*
Export Agriculture	competitive	10.00
Other Agriculture	competitive	0.75
Forestry	competitive	10.00
Mining	competitive	0.50
Resource Manufacturing	competitive	0.50
Traded Manufacturing	competitive	0.75
Domestic Manufacturing	competitive	0.50
Private Services	competitive	0.75

Imports - Consumption Goods

Commodity	*Form*	*Price Elas*
Export Agriculture	competitive	10.00
Other Agriculture	competitive	1.50
Forestry	competitive	10.00
Mining	competitive	1.50
Resource Manufacturing	competitive	1.50
Traded Manufacturing	competitive	1.50
Domestic Manufacturing	competitive	1.50
Private Services	competitive	2.00

Imports - Investment Goods

Commodity	*Form*	*Price Elas*
Export Agriculture	competitive	10.00
Other Agriculture	competitive	0.50
Forestry	competitive	10.00
Mining	competitive	0.50
Resource Manufacturing	competitive	0.50
Traded Manufacturing	competitive	1.25
Domestic Manufacturing	competitive	1.25
Private Services	competitive	0.75

Exports

Commodity	*Price Elas*		*Demand El*
Export Agriculture		passive	
Other Agriculture	2.000		1.000
Forestry		passive	
Mining	2.000		1.000
Resource Manufacturing	5.000		1.000
Traded Manufacturing	10.000		1.000
Domestic Manufacturing	2.000		1.000
Private Services	2.000		1.000
Oil		passive	

Aggregate Consumption

Elasticity to consume from labour income	0.900
Elasticity to consume from wealth	0.100
Elasticity to consume from Govt. debt	0.000
Semi-elasticity on real interest rate	-0.010

Wants Demands	
Frisch parameter	-1.75
Commodity	*Income Elasticity*
Food etc.	0.750
Clothing	0.900
Housing	passive
Durables	2.000
Quasi-durables	1.500
Transport	0.900
Services	residually determined

Investment Demands		
Activity	*Steady-State Growth*	*Elasticity on Tobin's q*
Export Agriculture	0.030	
Other Agriculture	0.030	
Forestry	0.000	
Mining	0.000	
Resource Manufacturing	0.090	
Traded Manufacturing	0.120	
Domestic Manufacturing	0.105	
Private Services	0.091	
Oil and Gas	0.040	0.100
Construction	0.071	

Supply	
Ag/N Ag population share relative wage elasticity	0.100
Ag/N Ag population share job probability elasticity	0.100
Usk/Sk population share relative wage elasticity	0.000
Usk/Sk population share job probability elasticity	0.000
Sk/Prof population share relative wage elasticity	0.000
Sk/Prof population share job probability elasticity	0.000

Notes: 1. The Frisch parameter is the reciprocal of the elasticity of the marginal utility of expenditure with respect to expenditure. It is used in the Stone-Geary expenditure system.

2. Under Tobin's q formulation, activities' demand for physical capital is an increasing function of the gap between the marginal product of capital and its user cost, which together determine profit. If Tobin's q is activated, this means that there will be a tendency for capital resources to be attracted to those activities which are most profitable.

3.

Finance: Households		
Loan elasticity wrt consumption		0.750
Loan elasticity wrt unincorporate income		0.150
Loan elasticity wrt capital exp:		0.100
Loan elasticity wrt loan rate		0.0001
Elasticity of EPF withdrawals		1.000
Assets	*Share Ceiling*	*Response*
Domestic-Foreign	1.000	200.00
Money-Non- Money	1.000	10.00
Equity-Non- Equity	1.000	50.00
Liabilities		
Bank-Other Financial Institutions	1.000	50.00

Finance: Firms		
Asset elasticity wrt nominal output		1.000
Asset elasticity wrt asset rate		1.000
Asset Composition	*Share Ceiling*	*Response*
Money-Non-Money	1.000	10.00
Equity-Non-Equity	1.000	50.00
Equity, Domestic-Foreign	1.000	200.00
OFI-Other Domestic	1.000	50.00
Liabilities Composition		
Liquid-Illiquid	1.000	50.00
Bank-Other Financial Insitutions	1.000	50.00
Equity-Non-Equity	1.000	50.00

Finance: Government		
Elasticity asset demands wrt expenditure		1.000
Elasticity wrt the asset rate		1.000
	Share Ceiling	*Response*
Money-Non Money	1.000	10.00
OFI-Other	1.000	50.00
Ceiling on bank share of loans	1.00	
Response parameter	50.00	

Finance: Non-Financial Public Enterprises		
	Share Ceiling	*Response*
Foreign-Equity	1.000	200.00
Working capital equity wrt output		1.000
Bond share in total assets		0.947

Finance: Employees Provident Fund		
Mark-up for loan rate	1.375	
	Share Ceiling	*Response*
Equity-Non Equity	1.000	50.00
Disc Bond/Other	1.000	50.00

Finance: Banks		
Mark-up for loan rate	1.309	
Deposit/Loan Ratio	0.820	
Assets	*Share Ceiling*	*Response*
Equity-Non Equity	1.000	50.00
Equity: Foreign/Domestic	1.000	200.00
Oth Domestic/Other Foreign	1.000	50.00
Liabilities		
Equity-Non Equity	1.000	50.00
Other Domestic/Other Foreign	1.000	200.00

Finance: Other Financial Institutions		
Mark-up for loan rate	1.027	
Assets	*Share Ceiling*	*Response*
Loans-Non Loans	1.000	50.00
Money-Non Money	1.000	10.00
Equity-Non Equity	1.000	50.00
Bonds-Other	1.000	50.00
Liabilities		
Loans-Non Loans	1.000	50.00
Equity-Non Equity	1.000	50.00
Bank-Employees Provident Fund	1.000	50.00

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